

JAN 1929

# AMERICAN JOURNAL of PHARMACY

SINCE 1825

Journal of the Progress of Pharmacy and the Allied Sciences

## COMMITTEE ON PUBLICATION

H. LaWall, Ph.D., Sc.D.

Joseph W. England, Ph.D.

J. W. Sherman, Pharm.D.

H. Tamm, Ph.D.

Arno Vischover, Ph.D.

E. Fullerton Cook, Ph.D.

IVOR GRIFFITH, Ph.D., Editor

Henry Leffmann, A.M., M.D., Special Contributor

Vol. 101

JANUARY, 1929

No. 1

## CONTENTS

### Editorial:

The Year is Dead—Long Live the Year

### Editorial:

Educating the Public. Reprinted from *Pharmaceutical Journal*, London, Eng.

The Unpardonable Abuse. Reprinted from *Journal Industrial and Engineering Chemistry*

### Original Articles:

The Pharmacy and Science of Dickens' Writings. By Charles M. LaWall and Millicent R. LaWall, Philadelphia, Pa.

The Progress of Science in 1928. Compiled and Copyrighted by Science

An Attempt to Prepare Mercury Compounds of Triphenylmethane. By Frederick R. Greenbaum, Philadelphia, Pa.

The Detection and Identification of Specific Cations with Sodium-Aluminum Sulfonate Reagent. By Frederick G. Gilman and Clifford M. Baltimore, Md.

Testing Some Common Antiseptics. By Edward E. Rose, Iowa City, Iowa

Organization of the New Library of the Philadelphia College of Pharmacy and Science

### Reprinted and Reprinted Article:

The Training of Apprentices. By H. B. Macdonald. Reprinted from *Pharmaceutical Journal*, London, Eng.

### Editorial and Pharmaceutical Notes

### News and Personal Notes

### Reviews

\$2.50 per Annum in Advance

Foreign Postage, 25 Cents Extra

Single Numbers, 30 Cents. Back Numbers, 50 Cents

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879

Acceptance for mailing at Special Rate of Postage Provided for in Section 1103, Act of October 3, 1917. Authorized February 15, 1929

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy and Science

43d Street and Kingsessing Avenue, Philadelphia, Pa.

# American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

MANUSCRIPTS should be sent to the Editor. It should be stated in this connection that the Editor does not assume any responsibility in connection with the views or investigations of contributors, other than to exercise general care in the selection of matter.

Contributors are allowed a reasonable number of copies of this JOURNAL, free of charge, if applied for when the proof is returned.

REPRINTS, if desired, must be applied for when the proof is returned. The table below shows the *approximate* cost of reprints, the make-up of the pages to be identically the same as in the JOURNAL. The actual cost may vary from the figures given, and will depend upon the amount of presswork, paper, binding, etc. Reprints containing half-tones may be expected to cost somewhat more than the rates given.

COVERS WITH TITLES		2 pp.	4 pp.	8 pp.	16 pp.
25 copies.....	\$1.75	25 copies.....	\$2.25	\$3.75	\$ 7.75
50 ".....	2.00	50 ".....	2.50	4.00	8.25
100 ".....	2.25	100 ".....	2.75	4.25	9.00
250 ".....	2.75	250 ".....	3.75	4.75	10.00
					12.00

Our readers will find it to their advantage to carefully consult the advertising pages when desiring to correspond with **STRICTLY FIRST-CLASS PARTIES.**

# THE AMERICAN JOURNAL OF PHARMACY

A RECORD OF THE PROGRESS OF PHARMACY AND THE  
ALLIED SCIENCES

Published Monthly by Authority of

THE  
PHILADELPHIA COLLEGE OF  
PHARMACY AND SCIENCE

---

COMMITTEE ON PUBLICATIONS

FOR 1929

CHARLES H. LAWALL, PH. M.,  
D. Sc.

JOSEPH W. ENGLAND, PH. M.

JOHN K. THUM, PH. M.

IVOR GRIFFITH, P. D., PH. M.

JULIUS W. STURMER, PHAR. D.,  
PH. M.

E. FULLERTON COOK, PH. M.

ARNO VIEHOEVER, PH.D.

EDITOR

IVOR GRIFFITH, P. D., PH. M.

HENRY LEFFMANN, A. M., M. D., Special Contributor

VOLUME 101

PHILADELPHIA, PA.

1929

PRESS OF  
INTERNATIONAL PRINTING COMPANY  
PHILADELPHIA, PA.

Chem. Lib.  
Pharms.  
Wolfe

# THE AMERICAN JOURNAL OF PHARMACY

VOL. 101

JANUARY, 1929

No. 1

## EDITORIAL

### THE YEAR IS DEAD—LONG LIVE THE YEAR

**T**HE OLD YEAR is Dead!

And with its passing, strangely comes, more a time of sadness than of gladness.

For it is a time much given to minding memories—a Time of parading the Dead—dead friends—dead voices—dead hopes—dead loves.

The resinous perfume of the bone-digesting yew—the creepy cold rustling of diaphanous shrouds—the dismal tolling, calling home clang of far-away bells—and visions of wrinkled lily wreaths scent-spent and sere—all contribute their narcotic share to the wake of the dying year.

The Old Year is Dead—Cold Dead.

Yet the Old Year is only a tired brown leaf which has fallen and the majestic forest is undisturbed. A million times ten million buds still edge the twig feverish for Spring's awakening. Cell-hidden, deep in the hearts of growing things, flower-colors rehearse their May-day performance.

But the Old Year is Dead—Stone Dead.

Still it is only a ripple that was spent on the crag, for the heaving ocean yet breathes and seethes and aches for action. Pale moons will still rise for ages beyond ages to contemplate the vast respiring seas. Only a grain of sand is mislaid—and Time will yet be when Sahara's sands congeal and warp to rocky peaks, and the Alps resolve to powder.

*Truly the Old Year is Dead!!*

*But the New Year lives! THE NEW YEAR LIVES!!*

And with its dawn, naturally comes, more a time of gladness than of sadness.

A L. H.

For this is more a Time of holding hopes—a Time of parading the Living—living friends—living voices—living hopes—living loves.

The perfume of promising primroses—the winter garments of repentance flung—the sprightly concord of sweet carillons—the soon coming crocuses, heralds of Spring—all contribute their exotic share to welcome in the youthful year.

*Yes the New Year is Alive!* WARMLY ALIVE!!

All of us may hope to set its months to music and its days to living dreams. Spring—Summer—Autumn—Winter, will come with flower showers, burning sun-gold, harvest moons, drifting snowflakes, and a song for every Season.

"How futile" sneers the pessimist "this bartering with unborn days." "How human" answers the optimist "how beautifully human this hopeful mortgaging of merry tomorrows."

"O Wind—if Winter comes  
Can Spring be far behind?"

That is the song of the optimist—pungent with hopes and purged of poignant memories.

For memories—sad and glad—please only part of life's big plan. Rather is it Faith in To-day and Hope for the Morrow that exalts the heart and spurs the soul its heavenward way. Faith in the work, the aims, the ideals of To-day, and Hope in the achievements, the rewards, the rest of Tomorrow.

"We live in deeds, not years, in thoughts not breaths,  
In feelings, not in figures on a dial.  
We should count time by heart throbs. He most lives  
Who thinks most, feels the noblest, acts the best.  
Life's but a means unto an end; that end  
Beginning, mean and end to all things—God."

On with our voyage then—and as we go let us renew our pleasant pledges. With happiness and with hope we extend to a wide circle of readers and friends our honest good wishes for the Year that comes so clean and new—1929.

For everyone—everywhere—a Blessed New Year.

IVOR GRIFFITH.

## SELECTED EDITORIALS

### EDUCATING THE PUBLIC\*

**I**F WE ARE TO TAKE some of our correspondents at their word, pharmacy is a chronic invalid stricken by an incurable disease, and the date of its dissolution is imminent. It was ever thus; but, like Charles the Second, pharmacy is an unconscionably long time in dying, but, unlike him, has a disconcerting trick of rallying remarkably and taking on a new lease of life. It would be idle to deny that our calling always enjoys good health, but with all its ailments, of which a sort of green sickness is the most common complaint, it has a sound constitution, and abounding recuperative power. Green sickness, like Mrs. Malaprop's "allegory on the banks of the Nile," is a symbolical expression for that "eternal lack of pence" with which the chemist is not alone in being afflicted. The crucial question is, what can be done to redress the balance, so that he shall win his due reward for business and professional service.

The doctors in the case disagree, but if anything they incline to the prognosis that if only the public could be educated to nurse and sustain the patient adequately and efficiently all would soon be well with him. This is a big order. When the electoral franchise was extended in 1867, Robert Lowe, who had opposed the Bill, exclaimed almost tragically, "We must educate our masters." Since then the public has been put through the mills of various systems of education, and at present thousands of able editors, and tens of thousands of scribes with facile fountain-pens or well-oiled typewriting machines, are educating the public morning, noon and night on a thousand and one subjects. It may be that all this intensive instruction is making for the spread of knowledge among the masses, but wisdom still lingers, and there is a real danger that in all this welter of propaganda the public may be bemused and stultified.

How shall we best educate the public as to the value and claims of the chemist? Can any abiding impression be made upon the community or the nation by any of the proposed forms of publicity for pharmacy? For example, will a "Pharmacy Week" such as is held in the United States open the eyes of the laity to its obligation to

\*Reprinted from the *Pharmaceutical Journal*, London, Eng.

give the chemist a business preference because of his superiority in respect of qualification and fitness to the unqualified trader? Can he becomingly proclaim his talents and merits from the housetops, or go out into the highways and byways and, like the Ancient Mariner, compel people to listen to his tale of woe? Will the free distribution of leaflets setting forth his antecedents and attainments enlighten the classes and the masses, as to the "true inwardness" of his vocation, and convince them that his is an exclusive and essential service? Or is the demonstration and vindication of his rights, claims, and dues to be sought through the medium of "community" advertising in the lay Press, on the cinema screen, and by flashing electric signs or smoke-writing in the sky? In our capacity as ordinary citizens, what is our own feeling in similar cases? Is it not that life is too short to allow of critical appreciation of all the claims that are preferred by this or that professional or trade body? *The crucial practical test always at hand is that furnished by our knowledge and experience of the personality and conduct of the man or woman with whom we have business or other relations.*

---

#### AN UNPARDONABLE ABUSE\*

**S**UCCESS IS ALWAYS capitalized, sometimes by those who have contributed to it, but often by those who, though having no part in it, would subvert it to their own uses. The accomplishments of chemistry have made things chemical attractive to many who prey upon the gullible, and a flagrant misuse of the word "chemist" has just come to our notice.

The *Brooklyn Daily Eagle* for December 13 carried a San Francisco despatch with the information that "the United Retail Chemists Company has been formed as the result of the absorption of the Neve Drug Stores by the United Cigar Stores Company of America." Details were then given with respect to stock issues, etc.

If those responsible for the choice of the name indicated have any regard for propriety, they will immediately seek another appellation for their company, obviously organized as venders of general merchandise. If those who sell the multitude of things now found

\*Reprinted from *Jour. Industr. and Eng. Chemistry*.

in the modern drug stores are to be allowed to call themselves "retail chemists," then certainly those who sell drugs only should be called "retail doctors," and where dentifrices and tooth brushes are handed over the counter we shall expect to find "retail dentists." The whole thing is utterly absurd, and vigorous steps must be taken to have all and sundry understand that the word "chemist" rightfully belongs to an ancient and honorable calling. To see "chemist" used as in the name of this company is a positive shock, for we have been led to believe that one of the results of the war was the opening of the eyes of the people to the necessity and importance of chemists in the defense and maintenance of the country, in the support and creation of industry, in contributions to public health and the fight against disease, and as leaders in the multiplication and preservation of our harvests. Surely these men are not retail chemists.

In England, the chemical profession has been distinctly embarrassed by the appropriation of the name "chemist" by those who are pharmacists, and has been helpless to prevent this misuse of the term. Pharmacy is a profession kindred to, but distinct from chemistry, and the American Pharmaceutical Association, which has so much to its credit, will be as incensed as we are over the misuse of the name "chemist." Here and there one occasionally finds a drug store on the windows of which is inscribed the name of some member of the staff as "chemist." This man may indeed be a chemist, but more often he is not and such a misstatement is another reprehensible practice. Even this is quite a different thing from what is involved in the term "retail chemists."

The time to stop this abuse is right now. The executives of the Neve Drug Stores and the United Cigar Stores Company of America must be made to see that common decency demands the withdrawal of the name, "The United Retail Chemists Company," and the substitution therefor of some designation that really describes what they intend to do. We must not permit a situation comparable to that in England to develop here.

## ORIGINAL ARTICLES

### THE PHARMACY AND THE SCIENCE OF DICKENS' WRITINGS\*

By Charles H. LaWall

and

Millicent R. LaWall

**T**HE SCOPE OF THIS ARTICLE may seem rather unusual and to some may seem incongruous, but an attempt has been made to record the impressions and expressions of Charles Dickens as exemplified in his references to and descriptions of pharmacy and pharmacists, of drugs and medicines, and also of his attitude toward science in general.

Dickens' doctors have already been surveyed in a comprehensive manner by a member of this organization, for Dr. Henry Leffmann read a paper on this subject at the first stated meeting of the Philadelphia Branch of the Dickens Fellowship, and Dr. Wilmer Krusen, who is also a member of the Fellowship, includes Dickens' doctors in an address which he gives to medical groups, entitled "Doctors in Literature."

One cannot divorce the pharmacist from the physician in a survey of either of these professions as practiced in London in the time of Dickens, for the "chemist and druggist," as the English pharmacist is often called, is a practitioner of medicine as well, and visits patients just the same as does the regular physician and surgeon, the difference being that the former practitioner charges only for his medicines and not for his professional services. In the time of Charles Dickens' boyhood, and he was but a boy, it must be remembered, when he served as a reporter and gained most of his impressions that he afterward used in describing the characters in his novels, many English physicians were essentially tradesmen of the chemist and druggist type; the so-called surgery was in reality a shop, as will be remembered in the case of "Sawyer (late Nockemorf)." It will be noted in this connection that Mr. Jobling, Medical Officer to the Anglo-Bengalee Disinterested Loan and Life Insurance Company, was one of these apothecary-dispensers, and also that he had a rather

\*Read before The Dickens Fellowship of Philadelphia, November 21, 1928.

poor opinion of his medicines, for he remarks to the wife of one of his patients concerning her husband's illness: "This little indisposition has done him more good than if he had swallowed the contents of one-half the nonsensical bottles in my surgery."

Nostrums, which we now erroneously call "patent medicines," were just beginning to be prevalent. The science of chemistry had just emerged from the art of alchemy. Professional and scientific education was neither easily obtainable nor popular with the masses.

Dickens evidently scorned scientific learning or had no knowledge of nor sympathy with it, for he was always ridiculing it. His physicians, with few exceptions, were quacks, his lawyers were shysters and his ministers were hypocrites. When he attempts to use scientific facts he frequently misapplies or distorts them.

After making a rather comprehensive survey of his entire writings one is forced to the conclusion that his knowledge of science was very superficial; it was a subject in which he was not interested. He was interested in human nature, and his character descriptions of professional men therefore are wonderfully entertaining but are typical usually of the worst specimens of each group.

The red lamp was a symbol of the chemist's shop or surgery of Dickens' time, and we meet with a number of references to it. In the sketch called *Billsticking* we find a comparison of the blushes of Mr. Cooper and Miss Billsmethi to such an illumination, for he says "You might have thought they were both standing under a red lamp at a chemist's shop."

In a sketch called *Out of Town* he describes a beach resort and says:

"I may observe of the very little wooden lighthouse, that when it is lighted at night—red and green—it looks so like a medical man's, that several distracted husbands have at various times been found, on occasions of premature domestic anxiety, going round and round it, trying to find the night bell."

The description of Mr. Winkle's visit to the domicile of Ben Allen and Bob Sawyer gives us a more complete picture of such an establishment:

"His eyes fell upon a newly painted tenement which had recently been converted into something between a shop and a private house, and which a red lamp, projecting over the fan-light of the street door, would have sufficiently announced as the residence of a medical practitioner even if the word surgery had not been inscribed

in golden letters on a wainscot ground above the window of what, in times bygone, had been the front parlor."

Let us step with Mr. Winkle "into the little shop where the gilt labeled drawers and bottles were." Here we meet Mr. Robert Sawyer (late Nockemorf), disguised in green spectacles for fear of recognition by creditors. When Mr. Winkle comments on the prosperous appearance of the establishment we are informed with the utmost frankness by Mr. Sawyer, regarding the drawers: "'Dummies, my boy—half the drawers have nothing in them, and the other half don't open,'" which is followed by the further avowal that there is "'hardly anything real in the shop but the leeches and they're second hand.'" He later gets his coal for the fire from a window seat labeled "soda water," and launches into a description of his method of impressing his fellow citizens with his importance and the activity of his practice.

This involves the regular services of the lamplighter who pulls the nightbell, the messenger boy who rushes into the church and ostentatiously pages Mr. Sawyer, and the sending of wrapped bottles of medicine to the wrong house. But let us hear the author describe this exemplification of professional ethics. Bob Sawyer is speaking to the messenger boy who wears grey livery and a gold laced hat.

"'Did you leave all the medicine?'"

'Yes sir.'

'The powders for the child at the large house with the new family, and the pills to be taken four times a day at the ill-tempered old gentleman's with the gouty leg?'"

'Yes, sir.'"

Upon Mr. Winkle's commenting upon this obvious evidence of the fact that business could not be as bad as had been stated, Bob Sawyer says:

"'He leaves it all at the wrong houses.'"

Mr. Winkle looked perplexed, whereupon Mr. Sawyer further elucidates:

"'Don't you see, he goes up to a wrong house, rings the area bell, pokes a packet of medicine without a direction into the servant's hand and walks off. Servant takes it into the dining parlor; master opens it and reads the label: 'Draught to be taken at bed time—pills as before—lotion as usual—the powder. From Sawyer's, late Nockemorf's. Physicians' prescriptions carefully prepared,' and all the rest of it. Shows it to his wife—she reads the label; it goes down

to the servants—they read the label. Next day boy calls; 'very sorry—his mistake—immense business—great many parcels to deliver—Mr. Sawyer's compliments, late Nockemorf.' The name gets known and that's the thing, my boy, in the medical way. Bless your heart, old fellow, it's better than all the advertising in the world. We have got one four-ounce bottle that's been to half the houses in Bristol, and hasn't done yet.' "

Then follows that never to be forgotten (by pharmacists, at least) description of the party, where the lack of tumblers was supplied by "a funnel with a cork in the narrow end," and "one of those wide-lipped crystal vessels inscribed with a variety of cabalistic characters, in which chemists are wont to measure out their liquid drugs in compounding prescriptions." Dickens certainly must have had a convivial pharmaceutical friend and must have attended such a party, else he could not have so graphically described it.

In the sketch called "Out of the Season," Dickens speaks of a chemist's shop:

"The chemist had no boxes of ginger beer powders, no beautifying seaside soaps and washes, no attractive scents, nothing but great goggle-eyed red bottles, looking as if the winds of winter and the drift of the salt sea had inflamed them."

Another type of apothecary shop is described in *Martin Chuzzlewit*, where Tom Pinch, on his visit to London "had less interest now in the chemists' shops, with their great glowing bottles (with smaller repositories of brightness in their very stoppers) and in their agreeable compromises between medicine and perfumery, in the shape of toothsome lozenges and virgin honey."

This reminds us of the fact that in former times sugar, honey and other sweets were esteemed for their medicinal virtues more than for their calorific values and were sold by pharmacists almost exclusively; also of the multi-colored show bottles, as they were called, which were just then coming into use as substitutes for the large-sized bottles of drugs macerating in their appropriate solvents, which had previously occupied the windows of apothecary shops, of necessity, for before the days of percolation (by which process a drug may be exhausted of its virtues in a few hours, where days were previously needed) certain preparations were directed to be exposed to sunlight for a certain number of days during their extraction, and the apothecary shop came to be known by the huge bottles which usually occupied the available window space.

*Tempora mutantur.* Perhaps in the modern researches in connection with heliotherapy and irradiation of chemical substances by sunlight to increase their vitamine efficiency, we may rediscover virtues in some of the older products of empiricism, which modern medical practitioners now spurn as worthless. Their present worthlessness may be due to the greater scientific skill (?) employed in their preparation. Who knows?

But we are digressing. Another reference in *Martin Chuzzlewit* to an apothecary is not very complimentary to the calling. This description is in connection with the illness of Mr. Jonas Chuzzlewit at the Dragon:

"Now there being no medical practitioner actually resident in the village, but a poor apothecary who was also a grocer and general dealer, the landlady had, upon her own responsibility, sent for him." Perhaps Dickens had been reading *Romeo and Juliet* at the time he wrote *Martin Chuzzlewit* and had tried to reflect the uncomplimentary picture of Shakespeare's apothecary, for later in the same work he has Mr. Jobling say:

"Your bosom's lord sits lightly on its throne, Mr. Chuzzlewit, as what's-his-name says in the play. I wish he had said it in a play which did anything like common justice to our profession, by the by. There's an apothecary in that drama, sir, which is a low thing; vulgar, sir; out of nature altogether.'" And so say we (pharmacists) all of us.

Another interesting instance of Dickens' familiarity with the apothecary in *Romeo and Juliet* is shown in *Nicholas Nickleby* where Mr. Vincent Crummles is commenting upon the histrionic possibilities of poor Smike:

"Only let him be tolerably well up in the apothecary in *Romeo and Juliet*, with the slightest dab of red on the tip of his nose, and he'd be certain of three rounds the moment he put his head out of the practicable door in the front grooves, O. P.'" Smike tries the part, and the comment is as follows:

"Smike, who having to sustain the character of the apothecary, had as yet been wholly unable to get any more of the part into his head than the general idea that he was very hungry."

Yes, Dickens knew something about Shakespeare, and certainly had been impressed by one character, at least.

Another example of Dickens' poor opinion of a member of the medical profession, particularly in connection with a phase of the

service which is closely allied with pharmacy, is found in *Bleak House*:

"Mr. Skimpole had been educated for the medical profession. He told us, however, that, as he had always been a mere child in point of weights and measures, and he had never known anything about them (except that they disgusted him) he had never been able to prescribe with the requisite accuracy for detail." And, as many pharmacists can testify, there are still some mathematical morons in the medical profession in spite of higher educational requirements in medicine.

The rather vague and indeterminate position of the apothecary during Dickens' period is shown by the following quotation from *David Copperfield*, where Steerforth says: "I saw a little apothecary there, surgeon or whatever he is, who brought your worship into the world."

None of Dickens' biographers ever has mentioned an association with pharmacy or pharmacists, and yet he certainly must have had some close contact with them or he could not have written the following descriptive paragraph about Jo in *Bleak House*:

"Scooping the knuckles of his right hand round and round in the hollowed palm of his left—kneading dirt with a natural pestle and mortar."

From the pharmacist's standpoint one of the most fascinating and humorous bits of dialogue in Dickens is found in the interrogation of the chemist by the judge in connection with the service of the former on the jury in the celebrated case of *Bardwell v. Pickwick*. Let us quote this gem in full:

"Thomas Groffin."

'Here,' said the chemist.

'I beg the court's pardon,' said the chemist, who was a tall, thin, yellow visaged man, 'but I hope the court will excuse my attendance.'

'On what grounds, sir,' said Mr. Justice Stareleigh.

'I have no assistant, my Lord,' said the chemist.

'I can't help that sir,' replied Mr. Justice Stareleigh, 'you should have one.'

'I can't afford it, my Lord,' rejoined the chemist.

'Then you ought to be able to afford it, sir,' said the judge, reddening, for Mr. Justice Stareleigh's temper bordered on the irritable and brooked no contradiction.

'I know I ought to do so, if I got on as well as I deserved, but I don't, my Lord,' answered the chemist.

'Swear the gentleman,' said the judge peremptorily.

The officer had got no further than 'You shall well and truly try,' when he was again interrupted by the chemist.

'I am to be sworn, my Lord, am I?' said the chemist.

'Certainly, sir,' replied the testy little judge.

'Very well, my Lord,' replied the chemist, in a resigned manner. 'Then there'll be murder before this trial's over, that's all. Swear me if you please, sir.' And sworn the chemist was before the judge could find words to utter.

'I merely wanted to observe, my Lord,' said the chemist, taking his seat with great deliberation, 'that I've left nobody but an errand boy in the shop. He's a very nice boy, my Lord, but he is not acquainted with drugs; and I know that the prevailing impression in his mind is, that Epsom Salts means Oxalic Acid; and syrup of senna, laudanum. That's all, my Lord.' "

Could anything be more nearly perfect?

Perhaps Dickens was at home in his London chemists' shops, but when he went across the channel in the *Tale of Two Cities* he was out of his element. Sydney Carton is making certain purchases, which are to play an important part in a later chapter of the book, as we shall see further on:

"He stopped at a chemist's shop, which the owner was closing with his own hands. A small, dim, crooked shop. Kept in a tortuous, up hill thoroughfare by a small, dim, crooked man. Giving this citizen good night, as he confronted him at his counter, he laid the scrap of paper before him.

'Whew!' the chemist whistled softly as he read it. 'Hi! Hi! Hi!'

Sydney Carton took no heed, and the chemist said:

'For you, citizen?'

'For me.'

'You will be careful to keep them separate, citizen? You know the consequences of mixing them?'

'Perfectly.'

Certain small packets were made and given to him. He put them one by one in the breast of his inner coat, counted out the money for them, and deliberately left the shop."

This is pure fiction. No substances are known to science that would be purchasable in any pharmacy that would call for such comment or have such an effect as is later described in the prison scene. Let us look at this later scene for a moment.

"This prisoner sprang up with a reproachful look, but Carton's hand was close and firm at his nostrils, and Carton's left arm caught him round the waist. For a few seconds he faintly struggled with the man who had come to lay down his life for him; but within a minute or so he was stretched insensible on the ground."

More pure fiction. Dickens had evidently made a scientific discovery which has never been revealed to the medical and pharmaceutical world. He probably had a dim and sketchy idea of the effects of certain narcotics and of general anesthetics, which were then just coming into use, and without consulting any professional or scientific authorities, he created a drug which answered his immediate purpose. Perhaps he was influenced by the fact that narcotic drugs were very much more frequently used and prescribed in his time than they are at present. There was no control whatever of such a drug as opium. Morphine was listed as a new and valuable remedy during Dickens' boyhood. Iodine and prussic acid were recent discoveries.

In the scene between Stephen and Rachel in *Hard Times*, in the room where Meg is lying ill in Stephen's home, there are references to a poisonous medicine that was being used to dress a wound that figures in the tragic episode when the delirious patient is about to swallow some of the poison, and Stephen nearly allows her to do it.

In *Edwin Drood* the opium smoking habits of Jasper are described with some particularity of detail. In the *Tale of Two Cities*, in Dr. Manette's story of his mysterious patient at the Estate of the Farmer General he says "I opened some of the bottles, smelt them, and put the stoppers to my lips. If I had wanted to use anything save narcotic medicines that were poisons in themselves, I would not have administered any of them."

We have previously referred to the mythical drug used by Sydney Carton in producing temporary unconsciousness in Charles Darnay. In *Martin Chuzzlewit* Dickens was a little more accurate in his statements. This is rather surprising in view of the fact that *Martin Chuzzlewit* was written more than ten years previous to the *Tale of Two Cities*. When Lewsome relates the story of Jonas' evil deeds in connection with the attempt to poison Anthony Chuzzlewit, he says: "He said immediately that he wanted me to get him

some of two kinds of drugs. One that was instantaneous in its effect, of which he wanted very little. One that was slow and not suspicious in appearance, of which he wanted more.'"

The poison plot is further described by Mr. Chiffey:

"He bought the stuff, no doubt as you have heard, and brought it home. He mixed the stuff—look at him!—with some sweetmeats in a jar, exactly as the medicine for his father's cough was mixed, and put it in a drawer.'" The slow poisoning attempt on his father's life failed, but here is the description of the effect of the quick poison. After Jonas' arrest he was being taken to the police headquarters in a coach. Slyme and the driver were on the box. Two men were inside with Jonas. Happening to pass a fruiterer's on the way, the door of which was open, though the shop was by this time shut, one of them remarked how faint the peaches smelt. The other assented at the moment, but presently stooped down in quick alarm and looked at the prisoner and cried: "'Stop the coach; he has poisoned himself. The smell comes from the bottle in his hand.'" The poison that is undoubtedly meant here is well known, but the odor is more frequently compared with bitter almonds than with peaches. The odor of peach kernels is similar to that of bitter almonds and is probably what was meant.

In *Hunted Down*, one of the shorter sketches, the author describes certain rooms as follows: "The rooms were in great disorder; there was a strong prevailing smell of opium, brandy and tobacco."

In the same sketch there is much conversation between Slinkton and Beckwith, which concerns itself with poisons in paper packets and small flat vials. Later in the sketch we have a scene which reminds us of the death of Jonas Chuzzlewit and in which the same poison is used as was there referred to: "When Meltham had spoken these last words, the miscreant suddenly turned away his face and seemed to strike his mouth with his open hand. At the same instant the room was filled with a new and powerful odor, and, almost at the same instant, he broke into a crooked leap, run, start—I have no name for the spasm—and fell, with a dull weight that shook the heavy old doors and windows in their frames."

Dickens certainly had a fairly broad knowledge of the *materia medica* of his time and there are numerous references to simples, home remedies, and even to some of the nostrums of his day. When Mr. Pecksniff's fall necessitated first aid measures, the relief came in the form of an external application of "pickled brown paper,"

originally made memorable by Jill's companion after the unsuccessful attempt to fetch a pail of water.

The reputation of vinegar, camphor and similar odorous drugs, as used to prevent contagion, is referred to in the sketch called *Worldliness*:

"I smelt vinegar, and what I know to be camphor, thrown in towards where I sat. Presently someone put a great vessel of smoking vinegar on the ground near me."

An official approached: "He came forward close to the vessel of smoking vinegar; from which he sprinkled himself carefully, and me copiously."

Later in the description of the case: "I was put in a bath and had new clothes brought to me; and my old rags were burnt, and I was camphored and vinegared and disinfected in a variety of ways."

In *Edwin Drood* is a fine description of a home medicine closet which is referred to as an "herbaceous penitentiary, where bunches of dried leaves hung from rusty hooks in the ceiling, and were spread out upon shelves, accompanied by portentous bottles."

In *Nicholas Nickleby* Mrs. Nickleby describes a method that she once used in getting rid of a cold: "'I had a cold once that I thought I could never get rid of. I was only cured at last by a remedy that I don't know whether you happened to hear of, Mr. Pluck. You have a gallon of water as hot as you can possibly bear it, with a pound of salt and six pen'orth of the finest bran, and sit with your head in it for twenty minutes every night, just before going to bed; at least, I don't mean you head—your feet. It's a most extraordinary cure—a most extraordinary cure. I used it for the first time, I recollect, the day after Christmas day, and by the middle of April following the cold was gone. It seems quite a miracle, come to think of it, for I had it since the beginning of September.'"

Some of the references to drugs and healing and pharmacists, are of a classical or a general character, as in *Master Humphrey's Clock*, where he refers to "witches who pluck the bleeding mandrake." and in *Nicholas Nickleby* where the following reference occurs:

"'Mrs. Witterly is Sir Tumley Snuffins' favorite patient. I believe I may venture to say that Mrs. Witterly is the first person who took the new medicine which is supposed to have destroyed a family at Kensington gravel pits.'"

And another in *David Copperfield* when: "Mr. Chillip said that the College of Physicians, the College of Surgeons, and Apothecaries'

Hall, if they were all called in together, couldn't help him. He was past both Colleges and the Hall could only poison him." Cheers from the apothecaries!!

In *The Begging Letter Writer* reference is made to fuming letters with tobacco smoke as a disinfectant.

A sketch called *Our Bore* has an interesting and detailed account of an individual who went from physician to physician, each one of whom diagnosed his case quite differently from all the others and prescribed a kind of medicine that he had not taken before.

A number of his references are to opium, the use of which was so prevalent at the time that it might almost be looked upon as a household remedy. In *Bleak House*, when Mr. Tulkinghorn visits Mr. Nemo at Krook's rag and bottle shop, the following description occurs:

"Foul and filthy as the room is, foul and filthy as the air, it is not easy to perceive what fumes those are which most oppress the senses in it; but through the general sickliness and faintness, and the odor of stale tobacco, there comes into the lawyer's mouth the bitter, vapid taste of opium." Later he says "'Here's poison by the bed,'" and the surgeon later comments, "'He has died of an overdose of opium, there is no doubt. The room is strongly flavored with it. There's enough here now,'" taking an old teapot from Mr. Krook, "'to kill a dozen people.'" This is in true newspaper reportorial style even at the present time.

Also in *Sketches*, under "Births—Mrs. Meeks of a son," the disturbed father complains:

"Analyze castor oil at any institution of chemistry that may be agreed upon, and inform me what resemblance, in taste, it bears to that natural provision which is at once the pride and duty of Maria Jane to administer to Augustus George; yet I charge Mrs. Podgett (aided and abetted by Mrs. Bigby) with systematically forcing castor oil on my innocent son, from the first hour of his birth. When that medicine in its efficient action causes internal disturbance to Augustus George, I charge Mrs. Podgett (aided and abetted by Mrs. Bigby) with insanely and inconsistently administering opium to allay the storm she has raised! What is the meaning of this?"

In the description of Coketown in *Hard Times*, he says: "Then came the chemist and druggist with other tabular statements showing that when they didn't get drunk, they took opium."

When we collect the entire list of what are called official drugs and preparations mentioned in Dickens' writings, the kind that are usually prescribed by physicians on prescription, we are impelled to the conclusion that Dickens must certainly have spent some time in the shop of a chemist and druggist, as a frequent visitor, at least, for the range is fairly wide. Who that has read it can ever forget the brimstone and treacle episode in *Nicholas Nickleby*:

"'We purify the boys' blood now and then, Nickleby. 'Purify fiddle-sticks cuds,' said his lady. 'Don't think, young man, that we go to the expense of flower of brimstone and molasses, just to purify them; because if you think we carry on the business in that way, you'll find yourself mistaken, and so I tell you plainly. . . . They have the brimstone and treacle, partly because if they hadn't something or other in the way of medicine they'd be always ailing and giving a world of trouble, and partly because it spoils their appetites and comes cheaper than breakfast and dinner.'"

In *Great Expectations* Dickens refers to a great panacea of Bishop Berkeley which was just completing a vogue begun in the previous century. It was tar water, and he says: "Some medical beast had revived tar water in those days as a fine medicine," and it will be remembered that Mrs. Joe Gargery used to deal it out rather generously, a pint for Pip and a half-pint for Joe. When Pip gets the tar water mixed into the brandy jug the tableau that follows Joe's discovery of the error is easily visualized.

In this same work Camilla complains of her symptoms and says "Raymond is a witness what ginger and sal volatile I am obliged to take in the night."

In *David Copperfield*, almost the first incident is concerned with the fact that David was born with a caul, which was advertised for fifteen guineas with no takers. Later it was sold to an attorney for two pounds in cash and the balance in sherry, and it finally fell into the hands of an old lady at a raffle. The effectiveness of its protection was aided by the fact that the owner was never on water in her life, except on a bridge, and finally died in bed at ninety-six.

Also in *David Copperfield*, Mrs. Crupp asked: "If I could oblige her with a little tincture of cardamums mixed with rhubarb and flavored with seven drops of the essence of cloves, which was the best remedy for her complaint—or, if I had not such a thing by me, with a little brandy, which was the next best. It was not," she remarked, "so palatable to her, but it was the next best." Later in

the same book, several significant items are charged to Mrs. Crupp, in the shape of a "half quartern gin and cloves" and a "glass of rum and peppermint."

In *Pickwick*, Bob Sawyer, when called upon to treat Ben Allen's aunt, recommends camphor julep three times a day and a composing draught at night. Later he complains of being nearly out of drugs and leaves his practice because he "should have been obliged to give them calomel all around and it would have been certain to have disagreed with some of them."

The restorative effect of soda water is also mentioned in this work, when it is described as having awakened symptoms of vitality in Ben Allen after that worthy had succumbed to the effect of the liquid joy that had circulated at the party.

In connection with the medicinal effects of the waters of the mineral springs at Bath, there is a delightful bit of dialogue between Mr. Weller and Mr. Smauker.

"Have you drank the Bath waters, Mr. Weller?" inquired Mr. Smauker.

"Once," replied Sam.

"What did you think of 'em, sir?"

"I thought they was partickelery unpleasant," replied Sam.

"Oh!" said Mr. John Smauker, "you disliked the Killibeate taste, perhaps."

"I don't know much about that 'ere," said Sam. "I thought they'd a wery strong flavor o' warm flat irons."

"That is the Killibeate, Mr. Weller," observed Mr. John Smauker, contemptuously.

"Well, if it is, it's a wery inexpressive word, that's all," said Sam. "It may be, but I ain't much in the chemical line myself, so I can't say."

Mr. Bounderby in *Hard Times*, has decided to impart some important information to Mrs. Sparsit: "On his way home, in the evening he set aside for this mementous purpose, he took the precaution of stepping into a chemist's shop and buying a bottle of the very strongest smelling salts. 'By George,' said Mr. Bounderby, 'if she takes it in the fainting way, I'll have the skin off her nose at all events.'"

In *Bleak House*, after Mr. Krooks had gone up in spontaneous combustion, which we shall refer to later, it is said of the "Sol," that

"the house has not done so much in the stomachic article of cloves or in brandy and warm water, since the inquest."

Patent medicines or nostrums were not unknown in Dickens' time and he shows his familiarity with a few of them. In *Our Mutual Friend*, Mr. Boffin, in speaking of advertising, says: "'They ain't pills, or hair washes or invigorating nervous essences, to be puffed in that way.'" Puffs or advertisements, in those days were usually in the form of handbills or on billboards or "hoardings," as they are called in England. In the sketch called *Billsticking*, this is partly revealed in the following: "Has any man a self-reproachful thought associated with pills or ointment? What an avenging spirit to that man is Professor Holloway." The gem of the collection of such references, however, is found in *Oliver Twist*, in connection with a nostrum of the early eighteenth century called "Daffy's Elixir," which was the Castoria of its day. The following dialogue takes place when Mr. Bumble, the beadle, calls on Mrs. Mann, the matron of the workhouse:

"'Now don't you be offended at what I'm agoing to say,' observed Mrs. Mann, with captivating sweetness. 'You've had a long walk, I know, or I wouldn't mention it. Now will you take a little drop of somethink, Mr. Bumble?'"

"'Not a drop. Not a drop,' said Mr. Bumble, waving his right hand in a dignified but placid manner."

"'I think you will,' said Mrs. Mann, who had noticed the tone of the refusal, and the gesture that had accompanied it. 'Just a little drop, with a little cold water and a lump of sugar.'"

Mr. Bumble coughed.

"'Now just a leetle drop,' said Mrs. Mann persuasively."

"'What is it?' inquired the beadle."

"'Why, it's what I'm obliged to keep a little of in the house to put in the blessed infants' Daffy when they ain't well, Mr. Bumble,' replied Mrs. Mann, as she opened a corner cupboard and took down a bottle and glass. 'It's gin. I'll not deceive you, Mr. B. It's gin.'"

"'Do you give the children Daffy, Mrs. Mann?' inquired Bumble, following with his eyes the interesting process of mixing."

"'Ah, bless 'em! That I do, dear as it is,' replied the nurse. 'I couldn't see 'em suffer before my eyes, you know sir.'"

"'No!' said Mr. Bumble approvingly. 'No! You could not. You're a human woman, Mrs. Mann.' (Here she set down the glass.) 'I shall take an early opportunity of mentioning it to the Board,

Mrs. Mann' (he drew it toward him). 'You fell as a mother, Mrs. Mann' (he stirred the gin and water). 'I-I drink to your health with cheerfulness, Mrs. Mann,' and he swallowed half of it."

If the curious reader tries to look up the word Daffy in reference books he will be unsuccessful unless he happens to look in one certain work on pharmacy, and then he will simply learn that it is a synonym for compound tincture of senna and was formerly called *Elixir Salutis* (Elixir of Health), but that will not help him with its history. The word Daffy is not found in any modern dictionary or encyclopedia.

Daffy's Elixir was a celebrated nostrum of the late seventeenth and early eighteenth centuries. The formula was devised by a Reverend Mr. Daffy of Leicestershire about 1670. It must have been very popular in its day for a formula for it was admitted to the famous London Pharmacopœia during the eighteenth century, and a host of imitations of the original Daffy appeared on the market as Dicey's Daffy, Swinton's Daffy, etc., so in the time of Charles Dickens the name had become generic, as applied to a remedy for fretful infants. Unlike many nostrums of its time, Daffy's Elixir contained no opiates or narcotics, and thus differed from a number of rival preparations of its period, such as paregoric, Bateman's Drops, and Godfrey's Cordial. It consisted of senna leaves extracted with French brandy, and a contemporaneous commentator said of it: "The purgative ingredient, which is the senna, bears so small a proportion to the quantity of spirit, in a dose sufficient for a purge, that it is too strong for persons who have not been accustomed to spirituous liquor." With such a small proportion of drug strength one would have to have a prescription to purchase Daffy's Elixir at the present time in the U. S. A.

"What'll you have?" "I'll take a Daffy." "Make mine the same, but put a little water in it."

In *Hard Times* is a reference to a pharmaceutical preparation, the identity and history of which has thus far eluded all search. Mr. Bounderby and Mr. Gradgrind are interrogating girl number twenty on the street of Coketown near the school:

'What have you got in that bottle you are carrying?'

'Gin,' said Mr. Bounderby.

'Dear, no, sir. It's the nine oils.'

'The what?' cried Mr. Bounderby.

'The nine oils, sir, to rub father with.'

Then said Mr. Bounderby, with a loud short laugh. 'What the devil do you rub your father with nine oils for?'

'It's what our people always use, sir, when they gets any hurts in the ring,' replied the girl."

The riding ring is here referred to, so it was probably a preparation used by grooms and jockeys. There are several subsequent references to nine oils in this same work.

And now we come to Dickens' attitude toward science in general and some references pertaining thereto. Sir Humphrey Davy, the eminent British scientist, had invented the safety lamp which bears his name and which is still used in many mines as a protection against the accidental ignition of inflammable gases. Dickens refers to this device in *Nicholas Nickleby* where he speaks of an old lady "who had carried the 'Davy' or safety lamp."

Nitrous oxide or laughing gas had just come into the public notice and it was the smart thing to give laughing gas parties at which the guests participated in the exhilarating effects for amusement. In the *Chimes* Trotty Veck is described in the following terms, indicating the author's familiarity with the effects of the gas: "The grin upon his withered face expanding in the process as if he were inhaling laughing gas."

In *Our Mutual Friend* Dickens compares the Veneering's butler to an analytical chemist:

"Meanwhile the retainer goes round like a gloomy analytical chemist—always seeming to say after 'Chablis, Sir?' 'You wouldn't, if you knew what it's made of.'"

It will be remembered that the Haunted Man was a chemist named Redlaw:

"His inner chamber—part library and part laboratory, for he was, as the world knew far and wide, a learned man in chemistry." Further along in the same sketch Mrs. Williams is described as "A sort of mother to all the young gentlemen that comes up from a variety of parts to attend your courses of lectures at this ancient foundation." Still further on he shows a knowledge of the technical meaning of the word "precipitate," as used by chemists, in the very expressive metaphor of the following paragraph:

"Tetterbys had tried its hands at several things. It had once made a feeble little dart at the toy business, for in another lantern there was a heap of minute wax dolls all sticking together upside

down in the direst confusion, with their feet on one another's heads, and a precipitate of broken legs and arms at the bottom."

A splendidly picturesque description of preparing potters' clay, followed by a detailed account of the methods of making various kinds of china and stoneware, is found in the sketch called *A Plated Article*.

Some of Dickens' references to or utilizations of scientific phenomena are not based on facts and are not supported by real scientific evidence. For instance, in *Our Mutual Friend* Dickens has John Harmon stupefied by a drug obtained from Riderhood, after which he emerges as John Rokesmith. Authors have a way of describing drugs unknown to physicians and toxicologists, and phenomena unknown to science. An example of the latter error on the part of Dickens is found in the case of spontaneous combustion of Krooks, described in *Bleak House*. The description of the empty apartment as observed when Guppy and Tony visit it to meet Krooks is vividly disgusting and will not be quoted. Those who wish to refresh their minds as to details may do so of their own accord. Of the inquest Dickens says:

"Men of science and philosophy came to look and carriages set down doctors at the corner who arrive with the same intent, and there is more learned talk about inflammable gases and phosphor-etted hydrogen than the court has ever imagined."

The author gives an air of verisimilitude to the account by giving pretended references to noted scientific works like the *Philosophical Transactions* and the *English Medical Journal*, but the scientific fact remains that no such death ever occurred nor ever could occur.

As regards science in general, Dickens evidently had no respect for it and was constantly poking fun at it. Science is exceedingly vulnerable in this respect and it is easy to ridicule what one does not understand. The attitude of Dickens probably grew out of his limited education and the fact that he was occasionally called upon to report scientific meetings for which he had neither sympathy or understanding. This is shown by his article on *The Mudfog Association*, which is surpassed as a satire on science only by the jokes in student journals in high schools and colleges, and these emanate from the same underlying cause—a lack of understanding of the real mission of science.

It is in *Pickwick*, his first book, that we encounter his scientific iconoclasm in its most subtle form. In the *Theory of Tittlebats* he pokes fun at archeology. In the report of the Committee of the Buckland Branch of the United Grand Junction Ebenezer Temperance Association, on the effect of gin and water on the life of wooden legs, he breaks out in a new place. He is at his best in describing the results of the knocking down and stunning of the gentleman of scientific attainments, who was mystified by the flashes of Mr. Pickwick's lantern in his escapade in Arabella's garden. The gentleman's reasoning was given in true scientific form:

"They were not meteors—they were too low. They were not glow worms—they were too high. They were not will-o-the-wisps. They were not fireflies. They were not fireworks. What could they be?"

The gentleman is reported to have made notes to form data for a treatise which should astonish the astronomical sages of the world. He then received a terrific bang on the head from Sam. This confirmed his suspicions. He concluded that these wonderful lights were the effects of electricity, for he received a "shock" from which he did not recover for a quarter of an hour. It is later said that when his paper was presented, the demonstration delighted all the scientific associations beyond measure and caused him to be considered a light of science ever afterward.

Another sarcastic slap at learning is found in Dickens' reference in this same work to the gentleman who wrote a treatise on Chinese metaphysics. "He read for metaphysics under the letter M and for China under the letter C and combined his information."

In *Nicholas Nickleby* he uses a scientific subject to illustrate the School of Practice at Dotheboys Hall. Squeers is speaking:

"Where's the second boy?"

"Please, sir, he's weeding the garden," replied a small voice.

"To be sure," said Squeers, by no means disconcerted. "So he is. B-O-T. bot, T-I-N, tin, N-E-Y, ney, bottiney, noun substantive, a knowledge of plants. He goes and knows 'em. That's our system, Nickleby, what do you think of it?"

"It's a very useful one, at any rate," answered Nicholas."

In his description of the "Mudfog Association for the Advancement of Everything" we have the acme of satirical description and nomenclature. Here we have banter, raillery, ridicule, derision,

chaffing, mockery, satire, and sarcasm. No field of scientific study is spared, although it would seem that medicine, pharmacy and the related sciences come in for the most comment. The names of the participants are grotesquely suggestive. Professors Snore, Doze and Wheezy start us off, and the list continues with Mr. Slug, Mr. Woodensconce, Professors Muff and Nogo, Mr. Blunderum, Dr. Kutan Kurragen, Dr. Fee, Mr. Knight Bell (M. R. C. S.), Mr. Ledbrain, Professor Queerspeck, Mr. Muddlebrains, Mr. Purbblind, Professor Rummun, The Rev. Mr. Longears, Professor Pumpkin-skull, Messrs. Pestle and Mortar, Drs. Dull and Dummy, Mr. Coppernose, Mr. Snuffletoffle and Mr. Blubb, to mention the most striking.

The sections of the Association it will be remembered are: "A. Zoology and Botany; B. Anatomy and medicine; C. Statistics; D. Mechanical Science." At the second session there was a rearrangement of these sections and one was added, Umbugology and Ditchwateristics. This gives room for considerable latitude as to subjects, so we find discussed under these various sections:

"A Plan for the Support of Superannuated or Disabled Fleas; The Use of Carbonated Soda Water as Manure; A Description of a Cauliflower larger than a Chaise Umbrella; The Last Moments of the Learned Pig; Exhibition of a Wax Model of the Interior of a Gentleman Who Had Swallowed a Door Key; Statistics on the Number of Dogs' Meat Barrows in London; The Total Number of Legs in a Town in Yorkshire (including chair, stool, and human legs); A Forcing Machine for Bringing Joint-stock Railway Shares Prematurely to a Premium; The Disappearance of Dancing Bears; A Twig from the Shakespeare Tree; A Pocket Picking Machine; Treatment of a Case of Monomania; Homœopathy, etc."

But enough. Why should we prolong the list? As humor, it is delightful, but it leaves one with the impression somehow that there is a vein of bitterness underneath. An inferiority complex, perhaps.

In the time of Dickens chemistry was just beginning to emerge as a distinctive science instead of being classed as a branch of natural philosophy. The Royal Institution, which had been founded by Benjamin Thompson, an American, was then in its infancy. Sir Humphrey Davy had just been succeeded by Michael Faraday as a brilliant exponent of its scientific achievements and possibilities. The fact that Michael Faraday at the time of his death was being paid a meagre pittance as a salary, a sum that would be scorned today

by a college graduate seeking his first position, is not without its bearing on the situation. Great Britain had not found itself either medically or pharmaceutically. There were three rival pharmacopœias of London, Edinburgh and Dublin until 1864. The apothecary practitioner had made medicine-taking popular, and the English have since been noted for their immoderate use of medicines.

We shall all continue to read Dickens and to love his characters and enjoy his descriptions, but in all probability, had he been a graduate of one of the celebrated English universities, or even had had a complete common school education, he could not have written half so effectively as he did. Nevertheless he was undoubtedly prejudiced, and ignorant in his attitude toward the professions and toward the sciences.

---

## THE PROGRESS OF SCIENCE IN 1928\*

### Medicine

**A** NEW MINIMUM death rate for tuberculosis was reached in 1928, the Metropolitan Life Insurance Company announced. The new rate is 72.1 per 100,000.

Yeast exposed to ultra-violet rays, either from sunlight or an artificial source, has its fertility vitamin E, destroyed, Dr. B. M. Strong of the school of medicine at Loyola University, Chicago, found.

Vitamin D, which prevents rickets in young animals, may also play an important part in the development of the egg, Dr. Alfred F. Hess, of New York, announced.

The presence of copper in the diet is a preventive of anemia, Dr. E. B. Hart, of the University of Michigan, found.

Teeth, shining by fluorescent light in the dark under the influence of ultra-violet rays, reveal by dark spots the regions where decay will develop, Dr. H. C. Benedict, of the Northwestern University school of dentistry, found.

An instrument for measuring a person's sensitivity to sunburn was invented by Dr. Robert C. Burt, of Pasadena, Calif.

\*Compiled and copyright by *Science Service*.

D. Hideyo Noguchi, of the Rockefeller Institute died of yellow fever as a martyr to his researches on that disease, leaving research which may show that the disease has two forms.

Eleven lepers were released by the U. S. Public Health Service apparently cured and no longer a menace to the community from the National Leper Home at Carville, La.

Means were found for administering chaulmoogra oil, the remedy for leprosy, without the pain and nausea which patients have had to endure in the past.

Epilepsy was produced artificially in dogs by a brain operation by Dr. Lawrence O. Morgan, of the University of Illinois.

A method of investigating the brain by means of X-ray photographs was perfected by Dr. Max Ludin, director of the Roentgen Institute of the Citizens' Hospital of Basel, Switzerland.

High-frequency electric currents were found to be beneficial in checking cancerous growths of mice and chickens.

For his work on tularemia, or rabbit fever, Dr. Edward Francis of the U. S. Public Health Service was awarded the gold medal of the American Medical Association, the committee on awards declaring that his contributions to the knowledge of the disease were the most important medical work of the year, judged on the basis of originality.

The final step in scientific conquest of Oroya fever, which afflicted the Incas and still occurs in Peru, was announced by four scientists of the Rockefeller Institute, who proved that the disease is spread by gnats.

Injections of glucose were found to be beneficial in acute cases of encephalitis, the European sleeping sickness.

A new theory that cancer is associated with and possibly controlled by the relative alkalinity of the blood was advanced by Dr. Ellice McDonald, chairman of cancer research of the University of Pennsylvania.

A lack of the important beta hormone, which controls the water depots of the body and the ability of the tissues to use water and which is in the post-pituitary gland at the base of the brain, may be made up by an artificial supply from animal glands, Dr. Oliver Kamm, of Detroit, Mich., announced.

Operation of apparatus transmitting short radio waves was found to produce fever in bystanders, and Dr. Helen R. Hosmer, of Albany Medical College, began experiments with the electrically in-

duced fever on animals, since fever is now an important treatment of progressive paralysis.

The effect of a dose of medicine depends not merely on the chemical make-up of the medicine but also on the alkalinity of the blood and on the particular balance of certain blood elements, experiments by Dr. William Salant, of the University of Georgia Medical School, indicated.

A new water purifier, succinchlorimide, that will not deteriorate with age was announced by its discoverer, Major C. B. Wood, of the U. S. Army Medical School.

A new industrial hazard, chromium poisoning is definitely increasing as a result of the widespread use of chrome plating on automobile accessories, was reported to the American Medical Association by Dr. Jackson Blair, of Cleveland, and studied by the U. S. Public Health Service.

The paper mulberry is one of the plants responsible for "hay fever," Dr. Harry S. Bernton, of Washington, announced.

Nobel Prize in medicine for 1928 was awarded to Prof. Charles Nicolle, of the Pasteur Institute at Tunis, in recognition of his typhus fever researches which have shown how the disease may be prevented.

The Grand Cross of the French Legion of Honor was awarded to Dr. Albert Calmette of the Pasteur Institute, for his work in producing a tuberculosis vaccine.

### Chemistry

Gluconic acid, a chemical hitherto obtainable only at a price of \$100 a pound, was produced at 35 cents a pound by chemists at the Color Laboratory of the U. S. Department of Agriculture, using a species of mould growing on a glucose solution.

Edible fats and fatty acids for soap making were made from paraffin through catalytic methods developed by the chemists of the German Dye Trust.

A magnetic theory of catalytic action in which molecules and atoms are conceived as having two poles like a bar magnet was advanced by Dr. Karl Krauch, German chemist.

Wall board is being manufactured from corn stalks in a special semi-commercial plant set up at Ames, Iowa, by the U. S. Bureau of Standards in cooperation with Iowa State College.

A commercial plant for making paper out of cornstalks was built in Illinois, the first of its kind.

The process for converting wood waste into an edible carbohydrate suitable for hog food devised by Dr. Freidrich Bergius, German chemist, was improved to the point of semi-commercial production.

The U. S. Bureau of Chemistry and Soils has evolved two methods of making from corncobs insulating briquettes to be used as a substitute for cork, especially in small refrigerating units.

A successful substitute fabric has been developed to replace gold-beater's skin in the making of gas cells for airships, and several months' use in the "Los Angeles" shows the new material to be cheaper and fully as good.

Anthraquinone, a basic raw material in the manufacture of dyes, was made by cheaper methods involving the use of catalysts or solution in furfural as a result of research by D. A. O. Jaeger, of Pittsburgh.

New methods of making artificial rubber were announced in Germany, though the process was not divulged.

A new explosive, known as "radium atomite" and claimed to be superior to T. N. T. or dynamite, was demonstrated to army engineers by Capt. H. R. Zimmer, of Los Angeles.

Synthetic sugar, from fructose and glucose, was made by two Swiss chemists, Prof. Ame Pictet and Hans Vogel.

"Bios," a vitamin that promotes the growth of yeast, was obtained in pure crystalline form by Dr. W. Lash Miller of the University of Toronto.

Experiments by dairy experts of the U. S. Department of Agriculture demonstrated that milk exposed to sunlight develops undesirable flavors and odors, whereas milk kept in the dark does not.

"Sunshine pills," consisting of synthetic Vitamin D, made by exposing ergosterol from yeast to ultra-violet rays, were placed on sale in Germany and England as a substitute for cod-liver oil.

An ultra-violet irradiated food was placed on the market, a commercial application of the discovery that ordinary foods exposed to ultra-violet rays promote the formation of healthy bones and teeth in children and young animals.

A new way to preserve ether for as long as eight months without spoiling or deterioration was devised by S. Palkin and H. R. Watkins.

A new system of chemical shorthand was developed by Louis

A. Leslie of New York, and Dr. C. A. Jacobson, professor of chemistry at West Virginia University.

The 1928 Nobel prize for chemistry was awarded to Dr. Adolf Windaus of Goettingen, Germany, for his part in experiments proving that ultra-violet light, either in sunlight or artificially produced, will activate ergosterol and confer on it antirachitic properties.

The Nobel prize award for chemistry, 1927, went to Prof. Heinrich Wieland, of Munich, Germany, in recognition of experiments on the complex compounds known as the bile acids.

### **Biology**

A moving picture record of the living rabbit's egg which discloses many new phenomena, hitherto unknown, was obtained by Dr. W. H. Lewis and Dr. P. W. Gregory.

The parathyroid gland plays a large part in the control of sex of unborn offspring, Dr. Simon B. Chandler, of the Loyola University School of Medicine, Chicago, found.

A new vitamin, needed by young trout for normal growth, was discovered in raw liver by a group of biologists at Cornell University, and received the provisional name "Factor H."

Legs and hearts were transplanted from axolotls to tritons, animals related to frogs and toads, by Dr. W. M. Copenhaver, of the University of Rochester.

Emanation of rays from living cells, which speed up the division of other cells as claimed by the Russian scientist, Dr. Gurwitsch, was denied by two German plant physiologists at the University of Rostock, Prof. H. van Guttenberg and Dr. Rossman, who repeated the Russian experiments with negative results.

Insects neither male nor female but containing characteristics of both sexes were produced in X-ray experiments by Prof. James W. Mavor, of Union College, Schenectady, working in a London laboratory.

Successful crossbreeding of Alaskan reindeer with native caribou and the production of fawns of materially increased weight, was accomplished by the U. S. Biological Survey.

A case of a mare mule which not only bore two healthy colts but had a grandchild was reported by A. H. Groth of Texas A. and M. College.

Canada undertook a census of the animals remaining in her musk-ox herds.

The attempt of the Soviet Government to save from extinction the wisent, Europe's representative of the bison family, failed, since careful searches of the 1100 square mile reserve made by naturalists showed no trace of a single living animal.

The first milk a cow produces after giving birth to her calf should be fed to the calf because it contains substances that ward off diseases, Dr. Theobald Smith, bacteriologist, reported.

The Carnegie Institution of Washington has completed an eugenical study concluding that laws for deportation of public charges becoming such from hereditary defectiveness should be extended and enforced.

Tuberculosis in livestock has declined, due to the cooperation of the Bureau of Animal Industry with local authorities; 11,300,000 cattle were tested during the past year.

The work of eradicating cattle ticks from Southern states gradually reclaimed more territory from the pest.

A hybrid of the radish and cabbage was produced by Dr. George D. Karpenchanko of the Botanical Institute at Detskoje Selo, in Russia.

Each species of tree has a definite pattern according to which sap and gases within its trunk are localized, and the gas body within each tree is continuous, studies by Dr. D. T. MacDougal of the Desert Laboratory, Tucson, Arizona, disclosed.

Zinc and boron are needed by plants, Miss A. L. Sommer and Prof. C. B. Lipman found at the University of California.

The fig growers of California cooperated with state officers in a strong effort to clean up the destructive brown-rot disease.

Two varieties of cattle grubs caused damage to livestock raisers estimated as \$100,000 for the past year.

Borax, in a concentration of one and one-half parts to a thousand of water, was discovered by Professor Robert Matheson and E. H. Hinman, of Cornell University, to be a fatal poison for mosquito larvae or wigglers.

Experiments with enormous cages, constructed of copper wire screening under the supervision of Dr. W. H. Larrimer on a farm maintained by the U. S. Bureau of Entomology near Toledo, Ohio, indicated that while it will be impossible to eradicate the corn borer, it can be controlled sufficiently to reduce commercial losses to a negligible amount.

A comparatively new bacterial disease known as "halo spot" destroyed large acreages of beans in the regions of Montana, Wyoming, and Colorado.

The \$1000 annual prize of the American Association for the Advancement of Science, for outstanding research during the preceding year, was awarded to Prof. H. J. Muller of the University of Texas, for his work on producing new varieties of fruit flies by X-ray treatment.

Scientists the world over celebrated the 80th birthday of Hugo de Vries, foremost student of evolution since Darwin's time.

### Physics

The cosmic rays which bombard the earth from outer space are evidence of the continuous creation of common elements out of electrons there, Dr. R. A. Millikan and Dr. G. Harvey Cameron, of the California Institute of Technology announced.

The Michelson-Morley experiment was repeated by Prof. A. A. Michelson, at Mt. Wilson Observatory, with much improved apparatus, and he announced that no motion of the earth through the ether of space could be detected.

Experiments with a thin film of gold conducted by Prof. George P. Thomson of the University of Aberdeen demonstrated that a stream of electrons contains waves, which may be the electrons themselves or may accompany the real electrons.

Ultra-violet rays in sunlight are responsible for the ionization of the upper layer of the earth's atmosphere which is connected with the Kennelly-Heaviside layer that reflects radio waves downwards, thus making long distance radio communication possible, announced Dr. E. O. Hulburt, of the U. S. Naval Research Laboratory.

The hypothetical element "coronium" visible in the sun's corona during eclipses may be identical with the rare gas argon, experiments by Dr. Ira M. Freeman of the University of Chicago indicated.

The highest electrical potential ever achieved by man, more than 5,000,000 volts, was obtained by Dr. Gregory Breit and Dr. M. A. Tuve at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

X-rays produced at the California Institute of Technology, with an electrical force of a million volts by Drs. S. C. Lauritsen and R. D. Bennett, showed the way towards artificial production of cosmic rays.

"Artificial lightning" at a potential of 3,600,000 volts was gener-

ated at the Pittsfield, Mass., laboratory of the General Electric Company.

Super-sonic waves, which are sounds vibrating too rapidly to be audible, were brought under such control that their action could be studied under a high-power microscope by Prof. E. Newton Harvey, of Princeton, and Alfred L. Loomis, of Tuxedo, N. Y.

Inaudible sound waves, nicknamed the "death whisper" because they kill small organisms in water, were produced at the unprecedented rate of two and one-half million per second in the private laboratory of Alfred L. Loomis at Tuxedo Park, N. Y.

Sheets of iron, gold and other metals so thin as to be transparent, were prepared by Dr. Carl Mueller of Charlottenburg, Germany.

Penetrating radium rays were used to test metal castings for flaws at the Russian State Radium Institute, Leningrad.

That helium gas leaks slowly through glass, even through high-quality pyrex, was demonstrated by experiments conducted by three Harvard scientists.

The use of exploding gas in rockets as a propulsive force for automobiles was successfully demonstrated in Germany by Fritz Opel.

The first actual measurements of the speed of lightning showing that it takes about one seven-thousandth of a second to complete itself and that it starts from the cloud and the ground at nearly the same instant, the two ends uniting in mid-air approximately one seven-thousandth of a second later, were determined by Prof. C. V. Boys, noted British physicist.

Outdoor television was pronounced possible through use of an extra large lens, with an extra large scanning disc, and extra large holes, all of which results in more light being picked up and focused on the surface of the sensitive cell, in a report to the Optical Society of America by Dr. Frank Gray and Dr. Herbert Ives.

The development of talking motion pictures was continued and several photo-dramas with complete dialogue and no printed titles were produced.

A million-volt cathode ray tube, equivalent in radiating power to a ton of radium, was built by Dr. W. D. Coolidge of the General Electric Company.

An improved cathode ray tube, simpler than an X-ray tube, was perfected by Dr. C. M. Slack, of the Research Department of the Westinghouse Lamp Co., making it possible for any well equipped

research laboratory to have at its disposal the important cathode rays.

A high-power short-wave vacuum tube able to light electric lamps without touching them was demonstrated in the laboratories of the General Electric Company, Schenectady, N. Y.; it heats flesh and blood in its vicinity, and can cause an artificial fever of 100 degrees Fahrenheit.

Two Swiss physicists, Dr. A. Piccard and Dr. E. Stahel, performed an ether-drift experiment with negative results.

A new X-ray moving picture camera which can be set to take pictures at regular intervals was invented by Arthur C. Pilsbury, of Berkeley, California, and believed to have important possibilities in showing inner processes, such as the knitting of broken bones.

A red neon arc light, claimed to be capable of shining through fog, and intended for airport beacon use, was invented by Dr. Clifton G. Found, of the General Electric Co., in collaboration with J. D. Forney, of the Cooper-Hewitt Electric Co.

A magnetic method of detecting flaws in steel castings as large as five or six inches thick was reported by Alfred V. de Forest, of Bridgeport, Conn.

A new metal so hard that it bores smooth holes in concrete, or cuts screw threads in a glass rod, was produced from a compound of tungsten and carbon and cobalt by Dr. Samuel L. Hoyt, of the research laboratory of the General Electric Co., and given the name carboloy.

A new camera, which makes photographs that appear solid to the eyes and which show different sides of the object depending on the angle from which the picture is viewed, was exhibited to scientists by its designer, Dr. Herbert E. Ives, the inventor of the method being Dr. C. W. Kanolt.

A triple film which would enable the amateur to make color snapshots with ordinary light and an ordinary camera was announced by F. J. Tritton, a British scientist.

Natural color movies that everyone can make and project were developed by the Eastman Kodak Company under the direction of Dr. C. E. K. Mees.

The Congressional Gold Medal was conferred on Thomas A. Edison by action of Congress and presented by Secretary of the Treasury Mellon at the Edison Laboratories, October 20.

The Optical Society of American celebrated the fiftieth anniversary of Prof. Albert A. Michelson's first announcement of his determination of the velocity of light by naming its annual meeting the Michelson Meeting.

A medal to be awarded annually by the Optical Society of America, for outstanding work in optical science was founded by Dr. Herbert E. Ives, of the Bell Telephone Laboratories, in honor of his father, Frederic E. Ives, inventor of the halftone process and other photographic methods.

---

## AN ATTEMPT TO PREPARE MERCURY COMPOUNDS OF TRIPHENYLMETHANE DYES

By Frederick R. Greenbaum, D. Sc., Philadelphia, Pa.

### A Preliminary Report

**M**ERCURY COMPOUNDS OF AZO DYES have been described by Proskouriakoff and Raiziss<sup>1</sup> and a general method for their preparation has been elaborated. Mercury compounds of phthaleins were prepared by German as well as American investigators. The outstanding piece of work in this field led to the production of "mercurochrome," which is a mercurated phthalein elaborated by E. White.<sup>2</sup> A more recent study on the mercuration of phthaleins was carried out by the writer and is published elsewhere.<sup>3</sup> The success of mercurochrome has attracted a number of research workers into this field of mercuration of dyes.

The researches of Churchman<sup>4</sup> have brought out the high germicidal value and the selective action of a number of dyes belonging to the triphenylmethane group. Dyes such as Gentian Violet, Brilliant Green, Malachite Green, and Acriflavine possess selective action as well as high germicidal values. All of these dyes, with the exception of acriflavine, belong to the triphenylmethane group and the thought occurred to try to prepare mercury compounds from these dyes. As far as the writer is aware no one has so far reported on the formation of mercury compounds of triphenylmethane dyes. The germicidal value of the dyes alone may greatly be increased by the combination with mercury, so that a compound might be formed which will have

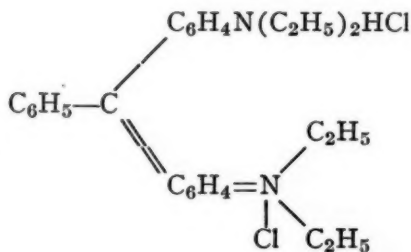
a higher germicidal value than any of the other mercurated dyes heretofore prepared.

The dyes, which were tried in this study, comprised the commercially available Brilliant Green, Malachite Green, Gentian Violet, Night Blue and basic Fuchsine. These dyes were bought from various commercial houses and only the purest quality was obtained and used for this purpose.

These dyes were then subjected to a mercuration, using the same method of mercuration that is described in the German Patent <sup>5</sup> for the mercuration of the phthaleins. The dyes should be in neutral or in acid solution; any alkalinity must be avoided as this will prevent the formation of the mercury compounds. Usually the triphenylmethane dyes, which are on the market, are salts of hydrochloric acid, zinc chloride double salts or sulphates.

### Experimental Part

The first dye studied in these series of experiments was Brilliant Green. Chemically speaking the dye Brilliant Green is the hydrochloride of tetraethyldiaminotriphenylmethane of the following formula:



Looking at this formula, there is no reason why it should not be possible to introduce mercury into one of the benzene rings of this compound just as it is possible to introduce mercury into the benzene ring of the phthalein molecule. The molecular weight of this compound is 457, so that it contains 6.1 per cent. of nitrogen. This compound, as obtained from commercial sources, when analyzed for nitrogen, gave only 4.80 per cent., showing that the commercial dye was by no means pure and the resulting correspondence with the manufacturer brought out that, as a matter of fact, these commercially available triphenylmethane dyes contain quite some inert materials, such as glucose, starch, inorganic salts, particularly sodium chlo-

ride. After purification with alcohol, by crystallizing the Brilliant Green from alcohol, the nitrogen went up to 4.95 per cent., still quite far away from the theoretical value. However, to get an idea as to whether this mercuration method will work, this compound was used and the mercuration carried out in the following way: 0.9 g. of the Brilliant Green were dissolved in 200 cc. of distilled water and heated to a boiling point. This boiling dye solution was slowly added to a boiling solution of 25 g. of mercuric bichloride in 100 cc. of water. Immediately a greenish precipitate was obtained, which was allowed to settle down; the supernatant fluid was decanted, washed three to four times with hot water, by decantation, then filtered off and washed with water until the wash water did not contain any inorganic mercury; it took considerable washings until this was the case. The amount of the precipitate was also greatly diminished, so that most of the free dye and all of the mercuric bichloride was removed by this washing. The obtained compound was of a dark greenish color with a certain sheen, similar to the free dye, and was barely soluble in water—in cold water it was practically insoluble, while it dissolved somewhat in hot water; however, it was more soluble in ethyl or methyl alcohol particularly in hot ethylalcohol, but even this solubility was not very great, reaching its maximum at about 0.2 per cent. The alcoholic solution could then be diluted with about 10 to 20 times the amount of water without precipitating the mercury compound.

The analysis of this compound gave for:

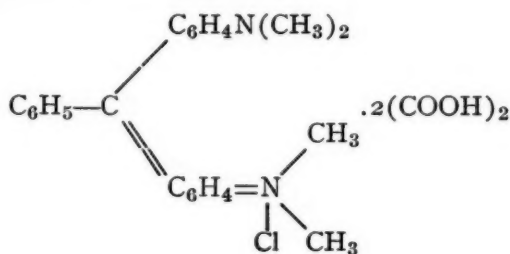
Nitrogen	2.2%	
Theoretical nitrogen	3.90%	
Found for mercury	21.03%	22.95%
Theoretical for mercury	27.90%	

This analysis shows that a mercuration has taken place, that mercury has entered into combination in the benzene ring. While the figures are not very close to the theoretical ones, one must remember that an impure dye was used to begin with and that with a pure dye most likely a theoretical value for a mono mercury compound would be obtained.

An attempt to purify this mercury compound by crystallization with alcohol was made by dissolving the compound in alcohol and allowing the solution, after removal of the alcohol, to crystallize. Very beautiful, shining crystals were obtained, which were analyzed

and showed for nitrogen 3.82 per cent. for mercury, however, only 11.81 per cent. The alcohol insoluble portion when analyzed contained 3.80 per cent. of nitrogen and 23.4 per cent. of mercury. It seems that the alcohol dissolves out the portion, which is low in mercury, and leaves behind the insoluble portion rich in mercury. It is interesting that such a separation took place, apparently on mercuration a mixture of mercury compounds is formed.

The next compound which was investigated was Malachite Green. The commercially available dye was the oxalate. The formula of this starting material was like this:



The analysis for nitrogen gave 5.31 per cent. instead of the theoretical 6.60 per cent., again showing that we are not dealing with a 100 per cent. pure dye, but that there are impurities in the dye, which the manufacturer of the dye readily admitted.

This dye was then submitted to the same mercuration process, allowing the boiling solution of the dye to act with a concentrated boiling solution of mercuric bichloride, using quite an excess of  $\text{HgCl}_2$ . The obtained precipitate was washed with hot water three times by decantation, filtered, washed with water until the wash-water no longer contained any inorganic mercury, then dried and analyzed. The analysis gave for:

Nitrogen	3.19%
Theoretical for nitrogen	4.60%
Found for mercury	20.92%
Theoretical	26.9%

which again indicated the formation of a mono mercury compound. This compound was then treated with alcohol, the soluble portion was evaporated and allowed to crystallize, while the insoluble part was dried and both were analyzed. The analysis of the alcohol soluble

portion gave for: nitrogen 3.05 per cent. and for mercury 19.36 per cent.; the insoluble portion gave for: nitrogen 2.44 per cent. and for mercury 23.1 per cent., which shows that the mono mercury compound is insoluble in alcohol, but most likely a mixture of mercury compounds is formed as in the case of Brilliant Green.

The next dye which was subjected to this same mercuration was Gentian Violet, obtained from the National Aniline and Chemical Company. It was marked for medicinal purposes, so it was supposed to represent a very pure brand. Chemically Gentian Violet represents a mixture of penta methyldiaminotriphenylmethane and hexamethyldiaminotriphenylmethane. The Gentian Violet was analyzed at first for nitrogen and it was found to contain 7.42 per cent. of nitrogen instead of theoretical 10.60 per cent. of nitrogen required for a pure compound. Again showing that the commercial Gentian Violet is by no means a pure chemical. This dye, when subjected to the same mercuration process, resulted in a very dark brown precipitate, which was washed three times by decantation with hot water, then filtered, washed with water until all the bichloride of mercury was removed, then dried. It represented a purple-dark brown powder, barely soluble in cold or hot water, but more soluble in hot alcohol, but even the solubility in alcohol did not exceed 0.3 per cent.

The analysis of this compound gave for:

Nitrogen	4.74%
Theoretical for nitrogen	6.60%
For mercury found	19.24%
For mercury theoretical	31.90% (mono mercury) (46.2% for a dimercury)

On treating it with alcohol and separating it into an alcohol soluble fraction and an alcohol insoluble portion, drying and analyzing these, the following values were obtained. The alcohol soluble portion gave the following results:

For nitrogen found	5.45%
For mercury found	16.85%

the insoluble portion showed the following values:

For nitrogen	2.05%
For mercury	41.94%

which this time shows plainly that the obtained mercuration products of Gentian Violet are mixtures of mono and di mercury compounds.

Another dye which was investigated was Night Blue. This dye was obtained from the La Motte Chemical Company and is used as an indicator, therefore represents a dye of very high purity. As a matter of fact the analysis for nitrogen proved this dye to be very pure.

Nitrogen theoretical for Night Blue is	7.30%
Nitrogen found for Night Blue is	8.01%

Therefore the mercuration of this dye resulted in the formation of a mono mercury compound. The actual mercuration was carried out in the same way as in the other dyes and the analysis of the mercuration product showed for:

Nitrogen calculated (for a mono mercury compound)	5.20%
Nitrogen found       "   "   "       "       "	5.24%
Mercury calculated	24.70%
Mercury found	22.25%

After treatment of this mercury compound of Night Blue with alcohol and dividing it into an alcohol soluble fraction, and an insoluble fraction the following analytical figures were obtained:

For the alcohol soluble fraction:

For nitrogen	2.76%
For mercury	26.81%

The alcohol insoluble fraction contained:

For nitrogen	5.38%
For mercury	21.94%

again showing that the alcohol insoluble fraction seems to contain the mono mercury compound, while the alcohol soluble portion is contaminated with some other mercury compounds.

The last dye in this series was basic fuchsine. The commercially available dye when analyzed again showed that it is by no means a pure dye and contained 10.41 per cent. nitrogen instead of the theoretical 16.0 per cent. of nitrogen.

The mercuration of this dye led to a red precipitate which was purified and dried as described before and analyzed; the following figures were obtained:

Nitrogen calculated	9.33%
Nitrogen found	4.49%
Mercury calculated	35.9%
Mercury found	23.83%

After treatment with alcohol in the same way as described before and separating it into an alcohol soluble fraction and an alcohol insoluble fraction, the following analytical findings were obtained:  
 Alcohol soluble fraction:

For nitrogen found	3.40%
For mercury found	18.19%

Alcohol insoluble fraction:

For nitrogen	4.88%
For mercury	34.00%

This result again shows that the alcohol insoluble fraction contains the mono mercury compound, while the alcohol soluble fraction contains other mercuration products.

The following table gives a compilation of the results obtained:

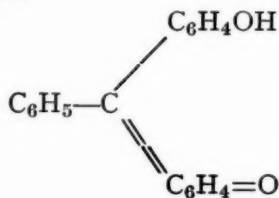
Name of Compound	Theoretical Value		Found for Crude Hg. Compound		Found for Alcohol Soluble Portion		Found for Alcohol Insoluble Portion	
	N.	Hg.	N.	Hg.	N.	Hg.	N.	Hg.
Brilliant green .....	5.80%	.....	4.80%	.....	.....	.....	.....	.....
Mercury compounds of brilliant green .....	3.90%	27.90%	2.20%	21.03% 22.95%	3.82%	11.81%	3.80%	23.4%
Malachite green .....	6.60%	.....	5.31%	.....	.....	.....	.....	.....
Mercury compounds of malachite green .....	4.60%	26.90%	3.19%	20.92% 19.30%	3.05%	19.36%	2.44%	23.1%
Gentian violet .....	10.60%	.....	7.42%	.....	.....	.....	.....	.....
Mercury compounds of gentian violet .....	6.60%	31.90%	4.74%	19.24%	5.45%	16.85%	2.05%	41.94%
Dimerc. ....	6.50%	46.2%	.....	.....	.....	.....	.....	.....
Night blue .....	7.30%	.....	8.01%	.....	.....	.....	.....	.....
Mercury compounds of night blue .....	5.20%	24.70%	5.24%	22.25%	2.76%	26.81%	5.38%	21.9%
Basic fuchsin .....	16.00%	.....	10.41%	.....	.....	.....	.....	.....
Mercury compounds of basic fuchsin .....	9.33%	35.9%	4.49%	23.83%	3.40%	18.19%	4.82%	34.0%

A glance at this table will show that the mercuration of these triphenylmethane dyes leads to mercury compounds of these dyes, probably representing mixtures of mono and di mercury compounds. The treatment of these mercury compounds with alcohol separates them into an alcohol soluble and an alcohol insoluble fraction. According to the analytical figures the alcohol insoluble fractions seem to be the mono mercury compounds while the alcohol soluble fractions seem to contain the other mercury compounds, which contaminate the mono mercury compounds. The great disadvantage, however, for therapeutic use is the complete insolubility of the mono mercury compounds. Only the crude mercury compounds, due to the contaminations, are somewhat soluble in alcohol—up to about 0.3 per cent.—and these solutions can then be diluted with water, without being precipitated, and can be tested in this way for their germicidal action, but the very low concentration is a great disadvantage for any therapeutic use.

In order to overcome this difficulty a solubilizing group such as a hydroxyl or a sulfonic acid or a carboxyl group would be required, in the molecule of the triphenylmethane dyes.

The writer, therefore, synthesized two triphenylmethane dyes, which contained a hydroxyl group in their molecule.

The first dye was obtained by condensation of phenol with benzotrichloride. This condensation was carried out in the following standard way: Two molecules of phenol were mixed with one molecule of benzotrichloride and stannic chloride was added (about two molecules), then heated in an oil bath to about 125-150° C. The stannic chloride served as a dehydrating agent and after about one hour of heating condensation began to take place and after several hours of heating the condensation was finished. The obtained condensation product was washed with hot water to remove the stannic chloride, then steam distilled to remove the excess of free phenol and benzotrichloride. The residue represented the phenol benzotrichloride condensation product of red color, insoluble in water, but easily soluble in dilute sodium hydroxide. The formula of this compound looks somewhat like this:



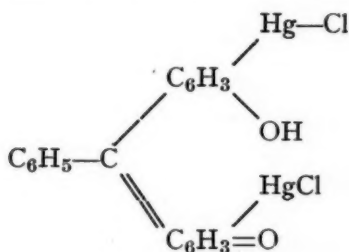
This dye then was the starting material for the mercuration, which was carried out in the following way:

15.5 g. of the phenol-benzotrichloride condensation product were dissolved in 100 cc. of  $n/1$  sodium hydroxide and were heated to a boiling point. The dye solution was gradually added to a boiling bichloride of mercury solution, obtained by dissolving 80 g. of  $\text{HgCl}_2$  in 200 cc. of boiling water. The obtained precipitate was washed by decantation three times with hot water, then filtered, washed with water until all inorganic mercury was completely removed, then the mercury compound was placed in a Soxhlet apparatus and extracted with alcohol until all the unchanged dye was removed, then dried and submitted for analysis:

For a mono mercury compound calculated for mercury	25.7%
For a di mercury compound calculated for mercury	51.40%
Mercury found	45.99%

This analytical result, while not within the theoretical value, indicated the formation of a di mercury compound, apparently contaminated with a mono mercury compound or with unchanged dye, and one is justified in assuming that the di mercury compound is the final product of mercuration.

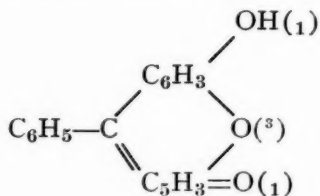
The obtained compound may have the following formula:



and represented a red amorphous powder, insoluble in cold or hot water, insoluble in all common organic solvents, but soluble in alkalis with fuchsine-like color. Excess alkalis make the color disappear. One g. of the substance should be finely ground to a very fine powder and digested with 2.5 cc. of  $n/1$  NaOH solution, which will bring it easily into solution. The presence of mercury in organic combination can be demonstrated by reducing the solution with so-

dium hyposulphate, which will give a heavy precipitate of black metallic mercury.

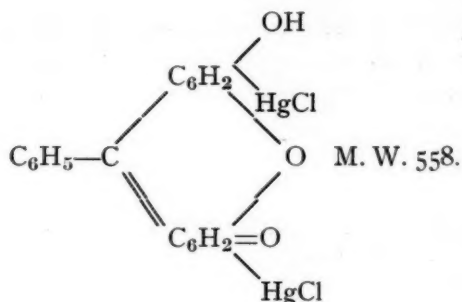
The other compound which was synthesized was a condensation of benzotrichloride and resorcinol, obtained by condensing two molecules of resorcinol with one molecule of benzotrichloride in the presence of stannic chloride as dehydrating agent. The obtained dye was of orange-red color and had the following formula:



14.5 g. of this resorcinolbenzotrichloride or p. p' tetra-oxytriphenylmethane were dissolved in 4 g. of sodium hydroxide and 200 cc. of water. This solution was heated to a boiling point and gradually added, after having it filtered, into a boiling solution of bichloride of mercury, which contained 80 g. of  $\text{HgCl}_2$  in 200 cc. of water. Immediately an orange red precipitate was obtained, which was purified by decantation with hot water, filtered, washed with hot water until all of the inorganic mercury was removed, then extracted in a Soxhlet apparatus with alcohol until all of the free dye was completely removed and the alcohol remained colorless, then dried and analyzed:

For a mono mercury compound; mercury calculated	35.80%
For a di mercury compound; mercury calculated	50.44%
Mercury found	41.60%

This analytical result shows that the mercuration again has given a mixture of a mono and a di mercury compound, but it is most likely that a di mercury compound is the main mercuration product in analogy to the previous compound, so that we can assign to the mercuration product of this dye the following formula:



This compound represents an orange-reddish powder, insoluble in cold and hot water, insoluble in all common organic solvents, soluble in dilute alkalis with a dark grayish-purple color. An excess of alkali will make the solution lighter and almost colorless. One g. of the substance requires 3.5 cc. of  $n/1$  NaOH solution, which will easily dissolve this mercury compound and make it available for therapeutic testing.

### Summary

This investigation has in a preliminary way demonstrated the possibility of introducing mercury into triphenylmethane dyes.

Brilliant Green, Malachite Green, Gentian Violet, Night Blue, Basic Fuchsin were mercurated and resulted in compounds having mercury in organic combination.

All these dyes did not give definite mono or di mercury compounds but the mercuration usually resulted in mixtures of various mercury compounds.

The very slight solubility of these mercury compounds of the above-mentioned dyes made it a disadvantage from a pharmaceutical point of view. The solubility of these compounds was not higher than a 0.3 per cent. in alcohol and could then be diluted with water.

For practical purposes and for therapeutic investigations it was necessary to obtain water or alkali soluble mercury compounds of triphenylmethane dyes. The condensation of phenolbenzotrichloride and of resorcinolbenzotrichloride resulted in alkali soluble triphenylmethane dyes, which on mercuration furnished di mercury compounds, which are easily soluble in alkalies. Therefore further investigation will be necessary along the line of alkali soluble triphenyl-

methane dyes and their mercuration. As this field has recently aroused a great deal of interest, the author deems it advisable to continue his investigations in this line of endeavor.

---

#### BIBLIOGRAPHY

1. A. Proskouriakoff and G. W. Raiziss, *Journal of the American Chemical Society*, Vol. 47, p. 1974 (1925).
2. E. White, *Journal of the American Chemical Society*, Vol. 40, p. 235 (1920).
3. F. R. Greenbaum, "New Mercury Derivatives of Phthaleins," paper presented before the St. Louis meeting, April, 1928, before the Medicinal Division of the American Chemical Society.
4. John W. Churchmann, *Industrial and Engineering Chemistry*, Vol. 18, No. 12, p. 1337 (1926), *Journal of the American Medical Association*, Vol. 85, pp. 1849-1853 (1925).
5. D. R. P. 308,335, Saccharin Fabrik, vormals Fahlberg, List & Co., Aktiengesellschaft, November, 1914. U. S. P. 1,455,495, February, 1915, August Klages.

---

### DETECTION AND IDENTIFICATION OF SPECIFIC CATIONS WITH SODIUM-ALIZARIN-SULFONATE REAGENT

By Frederick G. Germuth<sup>1</sup> and Clifford Mitchell<sup>2</sup>

#### Introduction

THE AUTHORS HAVE ENDEAVORED to describe in detail in the paper here presented, certain chemical reactions that have taken place in solutions of different inorganic compounds, when these solutions were treated with 0.5 per cent. solution of sodium-alizarin-sulfonate ( $\text{NaC}_{14}\text{H}_5\text{O}_2(\text{OH})_2\text{SO}_3 + \text{H}_2\text{O}$ ) as reagent, and which, it is believed, are of value in distinguishing these compounds in the presence of each other.

Previous to the experimental work undertaken and considered in this place, the observation that this reagent produced a typical reaction with the subsequent formation of a characteristic precipitate

<sup>1</sup> Chemist, Department of Public Works, Bureau of Standards, Baltimore, Maryland.

<sup>2</sup> Physician, No. 25 East Washington Street, Chicago, Illinois.

in solutions of uranium compounds, and also possessed the desirable property of combining, apparently, with certain substances with the formation of precipitates or colorations, was made by one of us.<sup>3</sup>

These facts suggested to the observer the feasibility of further investigation, particularly in respect to some of the so-called "rarer elements."

While the employment of Alizarin S has been advocated<sup>4</sup> for the detection of extremely small amounts of aluminium salts, a search of the literature fails to reveal further data or information relating to the utilization of sodium-alizarin-sulfonate as a reagent in qualitative work. It was deemed essential, also, to study the effect of the reagent upon low concentrations of the compounds to which it was added. The experimental work herein described is the result of further study and experimentation carried out with the objective of ascertaining the value of sodium-alizarin-sulfonate as a chemical reagent in qualitative work.

### Procedure Employed

1.0 per cent. solutions of the compounds considered in TABLE No. 1 were prepared and utilized in making the necessary tests. The salts so used were of c. p. quality, and, where such proceeding was considered essential, were further purified by re-crystallization, precipitation and other methods calculated to remove extraneous matter, and thus decrease the tendency to error.

The sodium-alizarin-sulfonate reagent was of extreme purity, containing but a negligible quantity of foreign substances. The salts employed in the experimental tests conducted were chemical combinations of the metals with nitric or hydrochloric acids, so selected because of their ready solubility in water.

The amount of reagent employed was carefully controlled by adding it to the solutions under examination from a certified buret, this procedure eliminating, it is believed, any discrepancies that might accrue because of differences existing in the proportions of reagent added to the test samples. The results attained by following the method given are enumerated in the following table:

<sup>3</sup> Dr. Clifford Mitchell.

<sup>4</sup> F. W. Attack, *Jour. Soc. Chem. Ind.*, 34, p. 936 (1915).

TABLE No. 1

REACTION OF POSITIVE IONS WITH SODIUM-ALIZARIN-SULFONATE REAGENT  
(5 cc. portions of 1% test solutions treated with 0.3 cc. of 0.5% reagent)

Compound	Color of Precipitate	Coloration Produced	Characteristics of Precipitate
Lead nitrate	purplish red	....	Flocculent; sol. in 1% acetic acid
Silver nitrate	....	dark brown	.....
Mercuric nitrate	dark red	....	Granular; sol. in 1% acetic acid
Mercurous nitrate	....	light yellow	.....
Bismuth nitrate	pinkish red	....	Characteristic; insol. in 1% acetic acid
Cupric chlorid	light red	....	Characteristic; insol. in 1% acetic acid
Cadmium chlorid	orange	....	Slimy; sol. in 1% acetic acid
Antimony(ic) chlorid	light red	....	Amorphous; insol. in 1% acetic acid
Antimony(ous) chlorid	....	deep red	.....
Stannic chlorid	orange	....	Amorphous; sol. in 1% acetic acid
Stannous chlorid	pink	....	Slimy; sol. in 1% acetic acid
Manganous chlorid	....	yellow	.....
Ferric chlorid	smoky black	....	Amorphous; insol. in 1% acetic acid
Ferrous chlorid	dark red	....	Slimy; insol. in 1% acetic acid
Cobaltous chlorid	red	....	Granular; sol. in 1% acetic acid
Nickelous chlorid	....	red	.....
Calcium chlorid	....	red	.....
Barium nitrate	....	light red	.....
Strontium nitrate	....	deep red	.....
Zinc chlorid	....	pink	.....
Magnesium chlorid	light red	....	Amorphous; sol. in 1% acetic acid
Sodium chlorid	....	yellow	.....
Potassium chlorid	....	yellow	.....
Ammonium chlorid	dark yellow	....	Granular; sol. in 1% acetic acid
Lithium chlorid	....	yellow	.....
Aluminium chlorid	tawny red	....	Flocculent; insol. in 1% acetic acid
Chromium chlorid	deep yellow	....	Characteristic; insol. in 1% acetic acid
Uranium chlorid	deep violet	....	Characteristic; insol. in 1% acetic acid
Platinic chlorid	purple	....	Flocculent; insol. in 1% acetic acid
Platinous chlorid	deep red	....	Flocculent; insol. in 1% acetic acid
Auric chlorid	....	light red	.....
Aurous chlorid	....	dark red	.....
Thorium nitrate	....	red	.....
Thallium nitrate	dark blue	....	Granular; insol. in 1% acetic acid
Titanous chlorid	black	....	Amorphous; insol. in 1% acetic acid
Cerium nitrate	....	deep brown	.....

### Observations

It will be observed from a perusal of the facts furnished in the accompanying table that several of the inorganic salts in solution produced, with the reagent, distinct colorations. It was believed, in some instances, that these changes might be brought about as a result of a definite shift in the pH value of the solvent upon adding the salt employed in each specific case.

The chemical properties of sodium-alizarin-sulfonate that classify it as belonging to that body of compounds containing the chromophore group, and which therefore render it applicable for use as an internal indicator with color changes at pH 5.0 and pH 6.8, substantiates this view.

The precipitates obtained, however, are characteristic for the compound from which these are derived, and apparently, are chemical compounds of definite structure. This statement seems to apply particularly to those insoluble compounds obtained by the chemical action of the reagent upon the solutions of silver, mercuric, bismuth, cupric, ferrous, cobaltous, stannic, aluminium, chromium, uranium, platinum, platinous, thallium and titanous compounds.

### Determination of pH Value

In order to differentiate between those colorations and tints that might be produced by a chemical combination of certain of the ions constituting the molecule of sodium-alizarin-sulfonate and the salt contained in solutions treated, and that observed as an indication of the  $H^+$  content, it was considered advisable to obtain by the employment of the usual hydrogen ion indicators, the true pH value of each solution exhibiting this phenomenon. Accordingly, experimental test solutions were prepared, containing in solution an amount of the salt similar to that utilized in producing the original test samples. It was found, by this method, that the colors obtaining in the solutions containing strontium, calcium, barium, zinc, nickelous and aurous ions were due to chemical combination of the sodium salt of sulfonated alizarin with the compound so treated.

The tints observed in the solutions containing mercurous, cadmium, antimonous, manganous, sodium, potassium, lithium, auric, thorium and cerium ions were, however, proved to be a measure of the free  $H^+$  and  $OH^-$  ions produced by a progressive hydrolysis superinduced by dilution.

Undoubtedly, in the solutions where precipitation had occurred, the chemical reactions responsible for this condition were characterized by the production of compounds typical of and specific for, the particular salt to whose solution the addition of the reagent had been resorted to.

### Sensitivity of Tests Conducted

Steps were now taken to determine the degree of sensitivity of the tests that had been made. To accomplish this purpose, very dilute solutions of the compounds utilized in this research which had exhibited colorations and produced precipitates as a result of a combination of the cations present in the test compounds with the alizarin salt, were prepared. To each 100 cc. of redistilled water contained in 250 cc. beakers was added a sufficient quantity of each substance to form a solution in which the reacting compound was present in the ratio: 1:10,000. Upon treating these with 0.1 cc. of reagent and one drop of 5 per cent. ammonium hydroxide solution, the reactions discerned were identical with those furnished in TABLE No. 1, with the exception that the silver ion produced a coloration that was so faint and indistinct as to render it practically worthless as a means of identifying the univalent metal.

Continued experimentation developed the interesting fact that in solutions in which precipitates had been the rule, the addition of 0.1 cc. of 5 per cent. ammonium hydroxide solution to each 100 cc. of the sample under examination caused the formation of the insoluble compound to occur more readily. This acceleration is attributed to the fact that when the pH of the solutions was lower than the point of neutrality, combination among the ions was apparently retarded.

The high degree of sensitivity obtaining and experienced in the reactions taking place in these latter tests in which the concentration of the reacting substances was comparatively low, led one to believe that further investigation of these reactions at greater dilutions was feasible. As this plan was effected, the observation that in the case of test solutions containing bismuth, ferric, mercuric, cupric, stannic, aluminium, chromium, uranium, platinic and thallium ions as well as those of titanium in the ous state, detection and subsequent identification of the compounds characteristic of the ions in question, was easily effected in solutions in which they were present in the proportion of one part of the salt to one million parts of water.

During the course of these tests it was revealed that two drops of the reagent when substituted for the amount formerly used, added greatly to the ease with which the precipitate or coloration was formed.

### Valence as an Aid to Sensitivity

It was ascertained that the degree of sensitivity of the reactions noted where the absolute concentration of the participating ions is low, was in the following order, with  $Al^{+++}$  ion showing the highest sensitivity, and  $Tl^{+}$  ion the lowest:  $Al > Ti > Cr > Fe > U > Cu > Pt > Bi > Hg > Tl$ . Consideration of the phenomena described would induce one to anticipate the conditions obtaining. It will be observed that those test solutions containing the ions of elements of highest valence and lower atomic weight are those possessing the highest degree of sensitivity. When the relatively high weight (molecular) of the compound, sodium-alizarin-sulfonate is taken into account, it is apparent that in the event that chemical combination is possible, merely a negligible quantity of an element with high valence and low atomic weight will be required to produce a rather large proportion, by comparison, of the resulting chemical compound in which the metallic ion is present, presumably as the positive-charged particle.

While some differences in the degree of coloration or extent of precipitation induced among ions possessing similar valences and differing but little in their atomic weights are observed, it is believed that the explanation expounded accounts largely for the phenomena to which reference is made.

Recognition is accorded, of course, to the fact that certain factors appertaining to the physical properties of the salts produced in this research subsequent to the addition of the reagent, other than that of solubility, influence the conditions under which precipitation or coloration occurs. However, it is evident that where the element so employed possesses a high combining power coupled with a low atomic weight, the visibility of such a combination is greatly enhanced.

Hence, the observation that the sensitivity of the tests in which minute concentrations of the reacting substances were employed was, apparently, in direct proportion to the quantity of the sulfonated alizarin compound required to effect this combination, must be attributed, in large part to the properties emphasized.

### Summary

The value of sodium-alizarin-sulfonate as a qualitative reagent in the identification of certain inorganic compounds, has been advocated.

This reagent appears to be particularly sensitive toward the ions of uranium, platinum (ic), tin (ic), titanium (ous), aluminium, bismuth, iron (ic), chromium (ic), copper (ic), mercury (ic) and thallium.

It is believed that where chemical combination is possible, ions of higher valence and lower atomic weight are productive of reactions characterized by greater sensitivity than that encountered in those in which the combining power is lower.

The addition of ammonium hydroxide in dilute solution, to the solutions containing minute quantities of the compounds discussed and considered here, appears to induce chemical combination to occur most readily.

---

## TESTING SOME COMMON ANTISEPTICS

By Edward S. Rose

**T**HE CONTENTION of the officials at Washington, who are charged with the enforcement of the Federal Food and Drugs Act, that an article, if antiseptic, must kill or inhibit the growth of bacteria, has caused many a manufacturer to change his label.

The Department bases its ruling on the interpretation of the word "antiseptic" as it is found in the standard dictionaries. The Government follows the scheme of examination worked out by George F. Reddish and may be found in the article "Testing Antiseptics" (*J. A. Ph. A.*, 16, 652, 1927).

Briefly the procedure of examination is to inoculate the sample or allow it to come in contact with a specially prepared culture of *Staphylococcus Aureus*, either in liquid or solid form as the case requires. Five minutes is the time allowed to kill in most instances. However, in a few cases, ten- and fifteen-minute periods are permitted. In the case of inhibition it should show after a period of incubation.

The writer examined some twenty proprietary preparations which bore statements on the packages as being antiseptic. In this

number were liquids, salves, pastes, powders and soaps. Very few were found to be antiseptic in accordance with the Government's interpretation.

These results were so interesting that the writer decided to examine a number of common articles sold in the drug store and generally considered by the laity to have antiseptic properties. These are recorded with the thought that the information may be of interest to pharmacists.

Among the many ointments sold in the drug store which are used more or less for their antiseptic value are mercurial, ammoniated mercury, iodine, thymol iodide, yellow oxide of mercury, calomel, zinc oxide, sulphur, ichthyol, compound resorcinol and tar. With the exception of the last five, these decidedly inhibited the growth of the culture. The best than can be said for the five mentioned is that they are very weakly antiseptic.

Soaps as a rule are not antiseptic according to the Government's interpretation. Only those that contain active germicides, as the mercurial salts, were found to be so. It is believed by many that the washing with any soap is antiseptic. This is not true in the sense that bacteria are killed.

The largest class of preparations sold in the drug store as antiseptics is the liquids. One group is the mouth washes and gargles. Of those that are official antiseptic solution was found to be antiseptic, while alkaline aromatic solution and Dobell's were not.

A prominent group of liquids are the solutions of the silver salts which are used mostly on the mucous membrane linings. Four common ones were examined, namely, silver nitrate, neo-silvol, argyrol and solargentum. In the prevailing strength of 5 to 10 per cent. they were found to be antiseptic.

Among the solutions applied externally for one reason or another are spirit of camphor, alcohol, bay rum, aluminum chloride solution, witch hazel, boric acid solution and saturated solution of magnesium sulphate. All but the last three were found to be antiseptic. Witch hazel, which is commonly thought to be antiseptic, is too low in alcohol to be so.

The group of liquids having the largest sale, perhaps, are those that are used for cuts and wounds, and for preoperative purposes. These must be effective germicides or infection will set in. Many physicians believe that a new and better antiseptic should be evolved

for the purposes mentioned here because of the many seemingly need-less infections.

Tincture of iodine, mercurochrome 2 per cent. aqueous, colorless tincture of iodine N. F., phenol 1-70, hydrogen peroxide, turpentine, and alcohol were examined. All were found to be antiseptic except the mercurochrome solution. This 2 per cent. mercurochrome solution is the one so commonly bought by the laity. The fact that it does not burn and leaves a red stain has made a strong appeal. This solution is no doubt a valuable agent where prolonged contact is possible, but it did not kill the test micro-organism in the five or fifteen-minute period.

Another mercurochrome solution examined, namely 2 per cent. in a mixture of acetone 10, alcohol 55, water 35 was found to be antiseptic. However, this mixture without the mercurochrome was found to be antiseptic. This combination with varying proportions of mercurochrome is not sold generally to the public but is receiving attention by physicians in preoperative work.

Colorless tincture of iodine was found to be quite antiseptic, which is contrary to common belief. Many of the laity think tincture of iodine owes its value to the alcoholic content; however, Lugol's solution, which contains no alcohol, was found to be decidedly antiseptic.

### Results of Examination

"—" Means Killed, "+" Indicates Growth

<i>Preparation</i>	<i>Time of Exposure in Minutes</i>	
	5	15
Ointments:		
Mercurial 30 p. c.	—	—
Ammoniated Mercury 10 p. c.	—	—
Iodine U. S. P.	—	—
Thymol Iodide 10 p. c.	—	—
Yellow Oxide Mercury 2 p. c.	—	—
Calomel 30 p. c.	—	—
Zinc Oxide U. S. P.	+	+
Sulphur U. S. P.	+	+
Ichthyol 10 p. c.	+	+
Compound Resorcinol N. F.	+	+
Tar U. S. P.	+	+
Lassar Zinc Paste N. F.	+	+

<i>Preparation</i>	<i>Time of Exposure in Minutes</i>	
	5	15
Soaps:		
Castile	+	+
Pear's Glycerin	+	+
Germicidal 1 p. c.	—	—
Liquids:		
Silver Nitrate 5-10 p. c.	—	—
Neosilvol 5-10 p. c.	—	—
Solargentum 5-10 p. c.	—	—
Argyrol 5-10 p. c.	—	—
Spirit of Camphor U. S. P.	—	—
Alcohol 70 p. c.	—	—
Bay Rum	—	—
Aluminium Chloride Sol. 25 p. c.	—	—
Distilled Extract of Witch Hazel	+	+
Saturated Solution of Boric Acid	+	+
Saturated Solution of Magnesium Sulphate	+	+
Tincture Iodine U. S. P.	—	—
Tincture Iodine, Colorless N. F.	—	—
Lugol's Solution U. S. P.	—	—
Solution of Hydrogen Peroxide U. S. P.	—	—
Turpentine	—	—
Phenol 1-70	—	—
Mercurochrome 2 p. c. aqueous	+	+
Mercurochrome 3 p. c. aqueous	+	+
Mercurochrome 2 p. c. in acetone 10-alcohol 55-water 35	—	—
Above mixture without mercurochrome	—	—
Antiseptic Solution N. F.	—	—
Alkaline Aromatic Solution N. F.	+	+
Dobell's Solution U. S. P.	+	+
Zonite	—	—
Flexible Collodion	—	—

Edward S. Rose Laboratory  
Iowa City, Iowa.

## PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE DEDICATION OF NEW LIBRARY



**The New Library**

**T**HE NEW LIBRARY of the Philadelphia College of Pharmacy and Science was dedicated to the use of youth in the search of truth on Monday, November 26, with formal addresses by Dr. Wilmer Krusen, President, Dr. Charles H. LaWall, Dean of Pharmacy and Mr. John B. Raser, of Reading, Pa., of the Class of 1871. The library equipment was a gift to the College by Mr. Raser and his brother Mr. William H. Raser, of New York, a graduate of the class of 1868, and Mr. Raser's son, Mr. William Heyl Raser, of Reading, Pa., a graduate of class of 1901.

The library is one of the largest and most complete pharmaceutical libraries in the United States, and includes the extensive private library of scientific books formerly owned by the late Professor Joseph P. Remington.

Dr. Krusen, in one of his typical brilliant addresses thanked the donors on behalf of the College and appealed for others to imitate

the sensible benevolence extended by the Raser family. He referred to the splendid library endowment fund already established at the College through the generosity of Miss Mary V. Dobbins, in memory of Edward Thompson Dobbins, and invited friends of the College to add to the collection of English Classics on the shelves.

During his remarks he recalled that—

"Job had wailed—'Would that mine adversary had written a book.'

"We have wandered far afield today from the period when St. Thomas Aquinas was asked in what manner a man might best become learned and he answered—'By reading one book.' Yet today it is said 'Beware of a man of one book.'

"The preacher in Ecclesiastes, even in his day and generation lamented that 'of making many books there is no end—and much study is a weariness to the flesh.'"

"What would be his emotions if Solomon could visit the Congressional Library today? Though established in 1800 it has 1,800,000 volumes on its shelves at the present time. Wearied though he may be by the multiplicity of books—how the booklover rages at the story of Abulfaragius and the destruction of the great Alexandrian Library, by the order of Omar the Arab—burned to furnish fuel for public baths for six months.

"How significant that it was in the reign of Ptolemy *Philadelphus* that libraries were first properly organized and established in separate buildings.

"The main object of books whether housed in a garret in Grub Street or the cottage of Ryecroft or a Carnegie palace or Congressional Library—are aptly summarized in the following statements: John Bright said—'You may have in a house, costly pictures and costly ornaments—a great variety of decorations, yet I would prefer to have one comfortable room, well-stocked with books, to all you can give me in the way of decorations which the highest art can supply.'

"'Books are the legacy that a great genius leaves to mankind,' states Addison.

"And Landor's observation supplements this statement—"The writings of the wise are the only riches our posterity cannot squander."

"Books themselves are therapeutic agents—Balfour says 'There is no mood of mind to which a man may not minister the appropriate nutriment or medicine at the cost of reaching down a volume from its bookshelf.'

" 'The humblest and poorest individual can summon to his companionship the kings of thought—the master minds of the world.'—Bayard.

"Give a man this taste for reading and you can hardly fail to make him a happy man.

"You place him in contact with the best society in every period of history, with the wisest, the wittiest, the tenderest, the bravest and the purest characters who have adorned humanity.

"You make him a denizen of all nations—a contemporary of all ages."

Professor LaWall's address is presented in full here:

"The library of the Philadelphia College of Pharmacy and Science, whose beautiful and efficient equipment we are about to dedicate today, is now more than a century old, for we learn from any early publication of the College called 'The Manual of the Philadelphia College of Pharmacy,' that in 1826 there were one hundred and eighty-two titles, comprising over three hundred volumes, in the catalogue of books there listed.

"This original nucleus of a scientific library has grown with the years in just about the same proportion as the student body has grown during the same period, for the College started with less than a dozen students and now has over seven hundred, while the library of less than two hundred titles has now increased to about fifteen thousand.

"A scientific library is different from a general library. Most of its books are 'to be tasted, some few of them are to be chewed and digested, but none of them is intended to be swallowed,' to use the well known similes of Baron Verulam, who wrote the best essay on books that has ever been given to the world.

"The sixteenth and seventeenth centuries must have been bookish centuries, for there was a contemporary of Francis Bacon, (a physician, by the way) named Kaspar Bartholini, who paid one of the finest tributes to books ever written, and which is peculiarly ap-

propriate to scientific books. This seventeenth century bibliophile wrote:

“Without books, God is silent, justice dormant, natural science at a stand, philosophy lame, letters dumb, and all things involved in Cimmerian darkness.”

“The original library of the College was a gift library, that is, all of the books were donated by College members. When we look over the list of original titles we are impressed by the fact that the field covered was very broad and the character of the works of unusually high quality. There were the London and Edinburgh Pharmacopœias, which were then representative of the pharmacy of Great Britain. The newly established French Codex was there, and it will be remembered that France is the only country that can boast of a pharmacopœia that is older than that of the United States, for in all other lands each principal city at that time has its own pharmacopœia, and there were no national pharmacopœias but the French and the United States. Strangely enough there seems to have been no copy of the first edition of the U. S. P. in this first list of books.

“Chemical works were represented by such authors as Accum, Bache, Bergmann, Boerhaave, Chaptal, Fourcroy, Hare, Klaproth, Lavoisier, Silliman and Ure, in addition to a chemical dictionary of Aiken and a work on toxicology by Orfila.

“Materia medica was represented by the works of Barton, Chapman, Coxe, Cullen, Eberle, Goulard, Magendie, Paris and Quincy.

“Pharmacy was represented by Baumé’s Elements of Pharmacy, which was still authoritative, nearly a half century after the death of its author.

“The natural sciences were represented by such authors as Cuvier, Darwin the Elder, Humboldt, Michaux, Nuttall, and Rumford.

“There were a number of works on special subjects, and some few periodicals.

“Surely this is a goodly list, and one of which the infant institution could be justly proud. A search of the present library catalogue shows that seventy-six of these titles, or nearly half of the original library, are still in our collection. Where the rest have gone, no one knows. Perhaps some of them are stored with a lot of old uncatalogued material which awaits investigation when opportunity offers. Those which are still in the possession of the li-

brary have been segregated in one of the library sections, where they will be kept as a separate historical collection.

"We who are here today are but three generations removed from those who founded this College and established this library. Nearly ten thousand students have passed through the corridors, have sat in the lecture seats, and worked in the laboratories of the several buildings which the College has occupied during the one hundred and seven years of its existence. Scores of College officers and faculty members have labored throughout the years to make possible the consummation of this past year's achievement—the erection of a new building, and in the dedication of this most important adjunct of our teaching work we near the completion of our present material needs.

"We of the present are only sojourners on the way, stopping for a while to do what we can to carry on the traditions, the ideals, and the teachings of a great profession. May we draw inspiration from the past, and here and now resolve anew to be worthy of this trust. Our responsibilities are great; may our strength be equal to the task and our course be wisely chosen, so that those of the future may look back upon our time with pride and satisfaction for work well accomplished."

On behalf of the donors Mr. John B. Raser told how much pleasure it had given him and his brother and son to donate the library equipment fund and that the money had been well spent was testified to by the splendid appointments evident in the department.

He expressed the hope that students at the Institution, where as a boy, he too had learned the joy of books, would find new inspiration and added comfort in their new environment—in Class Room, in Laboratory and last but not least, in the Library.

## ABSTRACTED AND REPRINTED ARTICLES

### THE TRAINING OF APPRENTICES\*

By H. B. Mackie, Ph. C.

IT IS ONLY RIGHT that we should realize that in the past the apprenticeship or indentureship method has served pharmacy well. It is only necessary to look around us to see the many able men that the system has produced, and that probably no other system could have produced. But conditions have altered considerably in the last twenty years, and it behooves us to inquire whether the old ways are the best fitted to meet the new needs.

I would divide those engaged in pharmacy into five groups:

- (1) The group of men and women in general practice, or retail pharmacy, although I dislike that latter term. This will be, in any time that we can foresee, the largest group.
- (2) The smaller group engaged in public pharmacy, in hospitals, poor law institutions, prisons, and the Navy. I am leaving the Army out. This group is increasing in numbers and in importance.
- (3) The group engaged in the preparation of galenicals and chemicals on a large scale.
- (4) The analytical group, small, but immensely important.
- (5) The teaching group, small, not important in this connection.

Now I take it for granted that you all agree that it is desirable that everyone engaged in pharmacy with the necessary educational attainments should be within the Pharmaceutical Society, subject to its discipline, contributing to its status, and sharing its privileges. Is then a retail apprenticeship really necessary or even desirable to all these groups? Before you answer too hurriedly that it is, I want you to consider two things: (1) There are not many pharmacies as good as yours; and (2) you may defeat the very end you have

\*Reprinted from the *Pharmaceutical Journal*. Paper read before a meeting of the West Ham and District Association of Pharmacists on November 15, 1928.

in view. There is, for example, the London Degree in Pharmacy. A young person passes the matriculation examination, enters college, and after a three years' course acquires the B.Pharm. degree. He intends, shall we say, to enter the wholesale laboratories. There is a certain probationary period when, despite his previous college training, his value is not great, *i. e.*, he must serve something in the nature of an apprenticeship. You will observe that he is a man of 21. You say that, notwithstanding the fact that this man has no intention of ever entering retail, he must be compelled to serve an apprenticeship in that branch of pharmacy before he can register, in addition to the period of probation that must necessarily occur when first entering a laboratory and his three years at college. Well, he just won't do it. And this is what will happen, nay is happening at this moment: a group of men, able and intelligent above the average, is growing up inside pharmacy, but outside the Pharmaceutical Society. Their number may be small, but it will increase, and being debarred from our Society they will form an association of their own which will link up with another body; and wild horses would not drag its name from me. Can we afford to let this take place? The doctors have an enviable status. Why? Is it due to the ordinary general panel practitioner? You know it isn't. It is due to the few distinguished men in their ranks who lift up the whole body. In the same way a small number of scientific men within the Pharmaceutical Society can raise the status of the whole of pharmacy. There is not a pharmacist or the smallest pharmacy in the meanest back street but would feel the advantage. You think I am exaggerating. Well, just examine the contributors to the science section of the Conference, to the Journal, the evening science meetings, and see from which section of pharmacy they come. What is the remedy?

#### **Concessions to Candidates for the Pharmaceutical Chemist Examination**

In my opinion it is this, that candidates for the Major qualification be permitted to acquire the 2000 hours necessary for registration in:

- (a) A recognised hospital.
- (b) A recognised wholesale laboratory.
- (c) A recognised analytical laboratory.

I think we should insist on limiting this concession to recognised laboratories and to those candidates who spend three years at a recognised college. In this simple way we shall remove the temptation for our wholesale friends to fill their works with apprentices. The parent who sends his son to college for three years is not going to let him be used as cheap labour to swell further the already overflowing bank balances of our manufacturing colleagues, nor relieve analysts and hospitals from the expense of employing porters. It also provides a test of the employers' sincerity. If it is really apprentices they want, then the apprentices had better have a good scientific education.

I say that I see no objection to permitting the candidate to take his examination before his apprenticeship, registration to follow after completing the 2000 hours. I am speaking, of course, only of the Ph. C. examination. So much for Groups 2, 3 and 4.

### Group I

And now for Group 1. Here I must walk delicately, like Agag, and that for several reasons. Some time has elapsed since I was in retail pharmacy, and I now realise that I was exceptionally fortunate in having the training I had. There are, however, certain broad principles that are quite clear:

(1) There are many different types of pharmacies included in the term retail. They vary from the very professional establishment to the type where victrolas seem to be the most important stock. They also vary from town to town. I have been in most of the towns of England, and have been struck with this variation. Even so, I am convinced that for those who intend to go into general practice an apprenticeship is absolutely necessary. Further, a really good apprenticeship is the very best training a youth can have. Also, any apprenticeship is better than no apprenticeship. It is well, however, to understand clearly what apprenticeship can do for the modern youth. I am concerned here with the average pharmacy, not the ultra-professional, nor yet the victrola merchant. It can teach him orderliness and method, carefulness, and politeness, and those attributes that can only be inculcated by repeated precept and daily example.

Priceless gifts these for the man who will have to face the public. Valuable, too, in giving him that something—which I call a sense of reality—that the academic person invariably lacks. He will make some acquaintance with dispensing medicine, usually, I am afraid, of a rather routine order. He will have the opportunity of seeing the provisions of Pharmacy Acts carried out, and early discover that the D.D. Acts are a veritable trap for the unwary. He will make some wonderful discoveries, for example, that distilled water is laid on in the town's mains, that infusion of gentian is made by diluting a dark coloured liquid with the aforesaid distilled water, and that England is a part of India, or is at least in the tropics, since it is only there that one may make peppermint water by shaking the oil with talc. And it will not do him any particular harm.

But there are some things the average apprenticeship cannot do. It cannot teach him the elements of galenical manufacture; economic considerations settle that, quite apart from the spirit rebate. Nor can it teach him the methods whereby these galenicals are tested and standardised. And a pharmacist who is handling things ought to know how they are prepared, and should be able to judge whether the galenicals he is buying are up to standard, even if it be only their appearance and odour and behaviour on dilution. This is where the schools come in.

### **A Scheme of Training** 159

In order not to monopolise your time I would suggest the following scheme for discussion: First, we must get the right type of apprentice. Hence the preliminary examination must be put on a respectable footing. The school certificate is the lowest that can be accepted. It is our contemptible preliminary examination that is our worst trouble. This is the prime cause of our appalling list of failures in our later examinations. This leading to unqualified store proprietorship and the consequent degradation of our calling. Having passed the preliminary, there are two courses open:

- (a) The student may remain for a further year at school and pass the preliminary scientific examination, or
- (b) He may enter directly on his apprenticeship.

And now we come to the point of considering how far apprenticeship can be regulated.

I have heard men declare that only certain recognised pharmacies should be permitted to take apprentices, and these pharmacies shall be open to inspection in the same manner as the recognised schools. Well, we may come to that, but I do not believe the time is ripe for that heroic step. We mostly resent that type of thing. I suggest that the better, the more British way, is as follows. That this branch or association appoint an education committee, and that they be instructed to formulate a scheme. Only the local people know the local difficulty. The first business of this committee will be to ask the headmasters of secondary and grammar schools to meet them and discuss the situation, outlining what pharmacy has to offer and what it expects of its entrants. Pharmacists requiring apprentices will notify the secretary, who will be in touch with headmasters, and will thus be able in a quick and serviceable way to advise boys and their parents.

This would avoid recruiting the wrong kind of youth, and would to some extent discover the really unsuitable pharmacists. The committee would, subject to the approval of the branch, decide what remuneration, if any, is to be paid, the length of the apprenticeship, etc. I suggest that in general a three-year apprenticeship is desirable, although the youth who has passed Part I, might be allowed to complete his in two years. During the first two years he should be allowed to attend college for two half-days a week. He would have to supplement this by attending one or two evenings per week. Whether the half-days are forenoon or afternoon is a matter for local arrangement. He ought at the end of two years to be in a position to sit for the preliminary examination with every prospect of success, and to devote the whole of his energies during the third year to his duties in the pharmacy. It would be one of the functions of the committee to see that these special classes were arranged. Education Authorities are usually glad to meet your wishes—it is what they are for. If the branch can see its way to giving one or two small prizes to these students, so much the better. It is wonderful what a little healthy emulation can do, and does, to sweeten relations where the young people feel that their employers are interested in their welfare.

### **An Advisory Body**

The Preliminary Scientific safely negotiated and apprenticeship completed, the committee assume a new function—they become an advisory body to a recognised school. In this way they can bring the breath of actual conditions into the school atmosphere, and thus ensure that apprenticeship and college shall not be watertight compartments—the one ought to be the complement of the other. Those things that were impracticable during their apprenticeship should now have special attention, and the Advisory Committee ought to make it a duty to see that this is so. The answer then to the question: "Can apprenticeship be taken in the retail pharmacy?" is "Yes," if the apprenticeship is continued under the ægis of the practising pharmacists at a suitably equipped college.

Do you feel I am too sanguine in thinking that these things can be done in all the large towns? Well, the idealists and the optimists may be wrong, but the pessimists and the cynics most certainly are; and I am satisfied that if some such scheme as I have outlined were adopted, we should build up a profession of which it would be an honour and a privilege to be accounted a member.

## MEDICAL AND PHARMACEUTICAL NOTES

---

**BLOOD CHEMISTRY DETERMINES DEGREE OF DRUG ACTION**—The effect of a dose of medicine depends not merely on the chemical makeup of the medicine itself but on the chemical state of the blood in our bodies when we take it. This is indicated by the experiments of Dr. William Salant, of the University of Georgia Medical School, performed at Augusta, Ga., and at the Cold Spring Harbor Biological Station on Long Island.

The blood of all warm-blooded animals is normally slightly alkaline. When Dr. Salant injected doses of the drug ergotamin into experimental animals whose blood alkalinity had been artificially reduced, a marked depression in their blood pressure resulted. It was possible to restore the pressure to normal or even to increase it beyond that point, simply by controlling the degree of alkalinity of the blood.

The effects of a drug depend not only on the alkalinity of the blood but also on the particular balance of certain elements. Dr. Salant has found that the concentrations of calcium and potassium in the blood are of especial significance in this respect. If the blood is lacking in calcium, adrenalin, a powerful stimulant and energy-releasing secretion, cannot produce results. Even a considerable reduction in the calcium content inhibits the action of adrenalin, unless the potassium present is correspondingly reduced.

If much potassium is present, the poisonous effects of nicotine are greatly increased; and in the presence of an excess of potassium the usually stimulating adrenalin reverses its behavior and becomes a depressant.

The toxicity of mercury is greatly increased by reducing the calcium concentration in the blood. But if the calcium content is increased the resistance to this poison, and also to arsenic, is correspondingly increased. This point may eventually become one of importance in medical practice, because both mercury and arsenic, though poisonous, are widely used in medicine, especially in the treatment of syphilis. The diet of the patient, in so far as it affects the potassium and calcium content of his body fluids, becomes a matter

of concern in the light of Dr. Salant's researches. It is recognized that the average American diet is very low in calcium.—(*Science Service*.)

---

BENZOL POISONING AS A POSSIBLE HAZARD IN CHEMICAL LABORATORIES, J. J. Bloomfield—As stated elsewhere, the study of benzol poisoning in industry disclosed the fact that the exposure to benzol vapor of concentrations even as low as 100 parts per million involves a substantial hazard. Conditions in chemical laboratories differ from those in industry in that the use of benzol is usually intermittent. So that it does not seem practical to apply the standards of vapor concentrations evolved for industrial establishments to those laboratories not using benzol constantly throughout the workday.

It is felt that in practically all chemical laboratories benzol could be substituted by some solvent known to be less toxic, such as toluol, xylol, or highflash naphtha. It is recommended at this time that in case the use of benzol in chemical laboratories is continued, it should be confined to the testing of materials only, and should not be employed as a cleansing agent. Also, in order to detect incipient benzol poisoning at a stage when its effects can be minimized, all laboratory workers exposed to benzol fumes should be given a thorough medical examination before employment, and re-examined, with systematic blood counts, once every month or two thereafter. Any worker whose blood picture, on re-examination, shows a marked departure from the normal (obtained from a previous examination) should be promptly excluded from benzol exposure.—(*Safety Engineering*. Reprint No. 1237—Public Health Reports, Sept., 1928.)

---

#### THE RESPONSIBILITY OF THE PHARMACIST UNDER THE PROHIBITION ACT.

"Recently the permit of a Baltimore pharmacist was revoked after a hearing before the Federal Prohibition Administrator and this action was reviewed by Judge W. C. Coleman of the United States Court for the District of Maryland, on appeal of the pharmacist."

The grounds for the revocation of the permit by the Administrator included among others, the question of the responsibility of a

pharmacist in filling prescriptions for alcoholic liquors. The Court in its decision reviewed the testimony submitted by the Administrator and the pharmacist, and made the following statement in reference to the responsibility of a pharmacist when filling prescriptions under the National Prohibition Act:

"There is nothing in the Prohibition Act which makes it the duty of a pharmacist to do more than satisfy himself that a prescription as presented is *prima facie* regular upon its face. The result of the findings of the Administrator is to rewrite the law, and to say to a pharmacist that he fills a prescription at his peril; in other words, that he must satisfy himself of the good faith of the physician issuing the same, even to the extent of actually identifying the patient named therein. Such requirement would be impracticable and unreasonable and is not to be implied in the enforcement of the present law. This does not mean, however, that a situation may not arise which would render it incumbent upon the pharmacist to make some investigation before filling the prescription. Just when such a situation might arise it is unnecessary to decide here. It is not to be determined by the number of prescriptions presented in any one day or given number of days, or by any other one circumstance."

The Court ordered the pharmacist's permit restored and an abatement of the penalties assessed in the case.

---

METRAZOL—A NEW STIMULANT—Metrazol—Pentamethylene-tetrazol.— $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{N}-\text{N}=\text{N}-\text{N}$ .

*Actions and Uses.*—The action of metrazol is similar to that camphor, but it is claimed to be more dependable, mainly on account of its greater solubility in water. Its action following injection intravenously or subcutaneously is induced promptly. Metrazol stimulates the vasomotor and respiratory centers in experiments on normal animals, but an experienced worker in this field found it a very uncertain respiratory stimulant in conditions of depressed respiration in animals, in which carbon dioxide, epinephrine and ephedrine were markedly effective; that as a circulatory stimulant it usually caused a

rise of blood pressure only in convulsive doses; that it did make irregularly beating hearts beat more regularly, but only at expense of depression of rate and amplitude. The use of metrazol is reported as a sustaining agent and restorative in chronic cardiac and circulatory insufficiency, in pneumonia, and in other infectious diseases. It has been reported to be of value in the emergency of cardiovascular collapse, in shock, in respiratory failure, and in narcotic depression. On the other hand, it causes capillary dilatation in the splanchnic region, and animal experiments indicate that the intravenous injection may be distinctly dangerous. It may be combined with digitalis and the xanthine diuretics.

*Dosage.*—Intramuscularly or intravenously, 0.1 Gm. ( $1\frac{1}{2}$  grains) every one to three hours; orally, from 0.1 to 0.2 Gm. ( $1\frac{1}{2}$  to 3 grains) several times daily as required.

Manufactured by Knoll A.-G., Ludwigshafen a/Rh., Germany (E. Bilhuber, Inc., New York, distributor). U. S. patent 1,599,493 (Sept. 14, 1926; expires, 1943). U. S. trademark 249,687.

*Metrazol Ampules*, 1 cc.: Each ampule contains 1.1 cc. of a 10 per cent. aqueous solution of metrazol.

*Metrazol Tablets*: Each tablet contains  $1\frac{1}{2}$  grains of metrazol.—(Jour. Amer. Med. Assoc.)

---

MODERN FAT-REDUCING AGENTS—L. Kofler, of Innsbruck, spoke on fat-reducing agents at the ninetieth meeting of German Natural Philosophers and Physicians held in Hamburg the last of September. Fat reducers, used so extensively today, contain, in addition to cathartics, *Fucus vesiculosus* as an active constituent. Even though the presence of *Fucus vesiculosus* is frequently stated upon the wrapper or directions, the fact that it, and consequently the reducing preparation also contains more or less iodine is for the most part overlooked, even by physicians. But it is precisely the chief consumers of fat-reducing preparations, the no longer youthful women, who are especially sensitive to iodine. Professor Kofler therefore demands that a compulsory statement of the iodine content be required for fat-reducing preparations containing *Fucus vesiculosus*. *Fucus vesiculosus* contains 0.01-1 per cent. of iodine, probably in

organic combination, and the fat-reducing tablets (Vesculan, Vesol, Fucusin, Tonaform, Gracilin, Efucsa, Tolabukerne, etc.) 40-86 iodine each.—(*Jour. Ind. & Eng. Chem. [N. Ed.]*)

TECHNIC OF SEDIMENTATION TEST—There are several different ways of performing the erythrocyte sedimentation test. A modification of Westergren's method, which is suitable under most circumstances, is as follows: By venipuncture blood is drawn into a small syringe and immediately mixed with 3.8 per cent. solution of sodium citrate, four parts of blood to one of citrate. This is mixed thoroughly and then drawn up to the 200 mm. mark in a 1 cc. pipet (300 mm. long with an internal diameter of 2.5 mm.), after which the pipet is stoppered. The time is noted and readings are made after one, two and twenty-four hours. The reading is the number of millimeters between the serum level at the 200 mm. mark and the erythrocyte level. Then, as explained by Westergren (*Brit. J. Tuberc. 15:72 [April] 1921*), "if the figure for one hour is compared with the halved figure for two hours, and the bigger of these two figures is regarded as expressing the *sedimentation per hour*, the reaction is expressed closely enough with one figure only." Normal two hour readings in the male lie between 1 and 5 and in the female between 5 and 10. The only special glassware needed in a small calibrated glass syringe, a 5 cc. calibrated measuring cylinder, and a 300 mm. (internal diameter 2.5 mm.) calibrated pipet. These may be obtained from any laboratory supply house.—(*Jour. Am. Med. Assoc.*)

CARBON MONOXIDE—Carbon monoxide, deadly gas that gives its victims no warning, is fatal in large amounts but in small amounts it has no harmful effects on the health or mind of the persons exposed to it, even for indefinite periods of time. Two parts or less of carbon monoxide in 10,000 parts of air is considered a safe amount.

The Bureau of Mines and the U. S. Public Health Service have just completed a study of the effects of this gas, both physical and mental, on healthy individuals. A report of the study will be issued shortly. Six persons who had been examined by competent physicians and pronounced in good physical and mental health were exposed to carbon monoxide in concentration of from 1 to 4 parts in 10,000 for

4 to 7 hours every day for 68 days. They were examined frequently during the test and at its finish by physicians and psychologists. The subjects remained in good health and showed no lack of appetite, no change in weight and no muscular weakness during or after the test. No harmful effects on the minds of the subjects were discovered by the psychologists.

When the concentration of the carbon monoxide was 2 parts per 10,000, half of the people showed no symptoms of carbon monoxide poisoning, such as headache, dizziness or faintness, no matter how long they were exposed. A few at this concentration had headache after three and one-half to four hours exposure. However, when the concentration was raised to 3 parts per 10,000, over half the subjects had distinct symptoms in five hours. Almost all of the people tested showed symptoms within three and one-half or four hours when the concentration was 4 parts per 10,000.

No harmful effects on the minds of the subjects could be found by means of psychological tests now known. If there are any such effects from prolonged exposure to carbon monoxide, we need more delicate tests to discover them, reported R. M. Dorcus of Johns Hopkins University and G. E. Wagon of the Mellon Institute who made the psychological tests.

The source of carbon monoxide in this investigation was the exhaust of a gasoline engine. The test showed, among other things, that any ill effects felt by traffic officers in the Holland Tunnel between New York and New Jersey are not due to carbon monoxide. The concentration of the gas in the tunnel is kept much lower than the lowest used in the tests.—(*Science Service.*)

---

DRUG ADDICTION DECREASING, FEDERAL SURVEY SHOWS—Drug addiction in the United States is greatly decreasing, in the opinion of Col. L. G. Nutt, Deputy Prohibition Commissioner, in charge of narcotics.

Col. Nutt so testified before the House Appropriations Committee this week, according to hearings just released. A survey made by him in all territory west of the Mississippi in which he interviewed state attorneys, police officers, field prohibition agents, Federal judges, and others, convinced him, he said, that the habit was becoming less and less common.

Col. Nutt denied emphatically that prohibition of alcoholic liquor was increasing the number of narcotic addicts in this country.

"It is not true," he said. "The two don't go together. A man addicted to narcotic drugs will rarely turn to liquor, or vice versa. We have made a careful study of that through the Public Health Service.

"You will occasionally find a man who will take morphine and cocaine, but not one who takes morphine and cocaine and whiskey."

Nutt estimates that there 25 big drug syndicates engaged in the traffic in the United States. He said that the cost of morphine in Boston was \$22.50 per ounce, when purchased wholesale in hundred ounce lots. By the single ounce it costs \$35 an ounce. To the trade, a dollar for one to four grains in cube form. The price in New York, he stated, was \$12 to \$16 an ounce, wholesale, and \$30 to \$35 an ounce in single ounces.

Dr. James Doran, Prohibition Commissioner, said that not only was drug-addiction decreasing, but that fewer and fewer young persons were becoming addicts in the last few years.

"Data—compiled data—show," he said, "that the age of the narcotic addict is increasing. The proportion of fresh addicts is lessening, the age of addiction increasing. Every other statement I have ever seen with respect to whether addiction is increasing or decreasing is an opinion, but this is a fact."—(*Science Service.*)

## NEWS ITEMS AND PERSONAL NOTES

OBITUARY—WILLIAM H. STONE—Mr. William H. Stone, for twenty-four years superintendent of the Mulford Pharmaceutical Laboratories, died at his home at St. Davids, Pa., following an attack of influenza, on December 11, 1928.

Mr. Stone was born in Burlington, Vermont. His early education was obtained in the Burlington public schools and after graduating from the High School, he entered the employ of Wells & Richardson Company, Wholesale Druggists, Burlington. While in their employ he took a correspondence course in the Chicago College of Pharmacy, which decided him to continue the study of chemistry, and he entered the Chemical Department of the University of Vermont, from which he graduated in 1889 with the degree of B.S.

After graduation, he went to Detroit, Michigan, and was in charge of the manufacturing department of one of the large pharmaceutical laboratories until 1901, when he went to New Orleans to become superintendent of the Nickells-Stone Chemical Company.

In 1904, Mr. Stone joined the staff of the H. K. Mulford Company as assistant superintendent, with direct charge of the manufacture of the pharmaceutical products.

He was a trustee of the Wayne Presbyterian Church, a member of the Detroit, Michigan and Boston Club, the Sigma Phi Greek Letter Fraternity, and the Contact Committee of the American Drug Manufacturers Association. He organized the Philadelphia Alumni Association of the University of Vermont and was its first President.

OBITUARY—OTTO KRAUS—Otto Kraus, Secretary of the Philadelphia Association of Retail Druggists and a prominent Philadelphia Pharmacist, died at his home, 1509 West Allegheny Avenue, Philadelphia, on Tuesday, November 6th, after a brief illness of one month.

Though in his seventy-fourth year Mr. Kraus was known as one of the most energetic men in Philadelphia pharmaceutical circles and enjoyed a wide circle of friends not only locally but nationally in the trade.

He was born in Leipsig, Germany, January 21, 1854, and came to this country in 1860. He entered the profession as an apprentice in the drug store of Dr. Gerhard, 331 East Belgrade Street, Philadelphia; graduating from the Philadelphia College of Pharmacy in 1875; entered the retail business for himself at 28th and Poplar Streets, Philadelphia, which was successfully conducted for many years.

Mr. Kraus faithfully served as secretary of the P. A. R. D. for nine years. He was an active member of the Alumni Association of the Philadelphia College of Pharmacy and Science and served as Trustee of the College. He was president of two building and loan associations; a member of Mount Moriah Lodge and Mary Commandery No. 36.

Funeral services were held on Saturday afternoon with interment at West Laurel Hill Cemetery. Active pallbearers were: E. D. Michener, Charles Reh fuss, George Fehr, Sam Davis.

The honorary pallbearers were: John K. Aughinbaugh, Harry E. Maeberry, William B. Hibbs, Russell T. Blackwood, Quintus Hoch, P. S. Rohn, M. F. Powers, A. G. Keller, John M. Woodside, Charles T. Pickett, B. C. Goodhart, A. Hunsberger, N. F. Weisner, H. B. McAllister, Professor Charles H. LaWall, Thomas F. McGowan, Leo G. Penn, Herbert Lilly, S. L. Gerhard, Frank C. Taylor, John J. Kelly, John C. Walton, Edward K. Cope, J. B. Simpers, B. G. Clapham, H. J. Siegfried, Harvey L. Wertley, Harry C. Zeisig, W. W. McNeary, Joseph W. Noble, David J. Reese, Dr. A. T. Pollard, Dr. Wilmer Krusen, Charles M. Miller, Harry W. Speidel, Harry Swain.

Mr. Kraus is survived by his wife and one son, Otto, Jr., a successful lawyer in Philadelphia, and two grand-daughters.

---

C. MAHLON KLINE HONORED—Mr. C. Mahlon Kline, President of Smith, Kline and French Company, Philadelphia, and a Trustee of the College, is the newly elected president of the National Wholesale Druggists' Association.

---

DEAN LAWALL'S "EXCHANGE" LECTURE IN NEW YORK—This year a pleasant arrangement has been made between the two oldest colleges of pharmacy in this country—the Philadelphia College of

Pharmacy and the New York College of Pharmacy—whereby a series of exchange lectures will be given by the members of the faculties of the two institutions. During November, Dean Rusby of the New York College gave a lecture on his South American trips to the students of the Philadelphia College and on December 12th, Dean LaWall of the Philadelphia college returned the compliment by giving an illustrated lecture on the pharmaceutical chemists of the by-gone days to the students of the New York College.

After Dean LaWall's lecture, he and Mrs. LaWall visited all parts of the college building after which an informal faculty reception was held in the college library, followed by an informal dinner at the Hotel Dauphin tendered to Dean LaWall by the members of the faculty.

---

A STUDY OF BLUFFING BY STUDENTS—The October issue of the *American Journal of Psychology* (1928, 11, 613) contains an article by E. Thelin and P. C. Scott, giving results of an investigation of the extent to which students will pretend to knowledge that they do not possess. The tests were made at the University of Cincinnati. A previous test of this nature was reported in 1927 (same journal) by Dr. S. W. Fernberger of the department of psychology of the Graduate School of the University of Pennsylvania. Suspicion having been aroused that students were "bluffing," a test was made by giving for definition and discussion ten terms in psychology, one of which, "psychoterminality," was fictitious. Of twenty-nine students who took the examination, two frankly acknowledged ignorance of the term; six passed it without allusion and the remainder—twenty-one—discussed it at differing lengths from a half page to three and one-half pages.

This brief statement is liable to make the unskilful laugh and the judicious grieve, but a closer analysis materially ameliorates the unfavorable judgment of the twenty-one. Dr. Fernberger gives a summary of the answers, many of which showed originality, based on an effort to determine the etymology of the term. (It would be interesting to see the reaction of a group of students who had taken a good course in the classics.) It is evident that all took the question in good faith, and as a matter of fact it was so close in form to some of modern psychologic terms that misunderstanding was not unnatural.

The Cincinnatti test was much more extended, and applied to subjects in English literature. The report does not give very much detail, but part of the plan seems mainly to have been mixing genuine, well-known, quotations, particularly from Shakespeare, with purely fictitious ones and requiring all to be located. A slightly higher percentage of "bluffing" was noted among men than with women, but this may be due to the lower initiative and less originality of the female mind.

In judging of such results the condition of the student's mind under the stress of examination must be taken into full consideration. If it is a final examination, the student feels that it is a last chance, and that effort should be made to secure as full a series of answers as possible. Taking as he does the question for sincere, he tries to interpret it according to the information that has been given in the course. This feeling is shown by some of the answers to Dr. Fernberger's question. Three students defined the term to mean a summary of psychologic terms; two said it means the limits of psychology. Four defined it as "prediction of end," presumably meaning "forecast" or "prognosis."

The results of such tests may be discouraging, but they are far less so than the evidence constantly and abundantly presented of the lack of proper preliminary training of the men and women in our educational institutions. There is a serious lack of ordered knowledge, a lack of ability to spell and to use reasonably good grammar. The results of many years of neglect along these lines is finding expression in recent scientific works. "Data" is used as a singular noun, often unintentionally, but, as the columns of recent issues of *Science* will show often deliberately. Still greater inefficiency is noted in connection with arithmetic. Simple problems in calculations are bungled and ridiculous answers made to comparatively simple questions.

H. L.

## BOOK REVIEWS

---

WELLCOME PHOTOGRAPHIC EXPOSURE HANDBOOK, Burroughs, Wellcome & Co., New York City. Price \$0.75.

The 1929 edition of the "Wellcome" Photographic Exposure Calculator Handbook and Diary maintains in every way the high standard of its predecessors. Several new features have been added and the regular instructions have been completely revised. The diary is neatly bound, and complete with pencil and mechanical exposure calculator. Although it takes up so little room—it can be slipped into the pocket—it is an encyclopædia of photographic methods, and embodies the experience of many years' practical photographic procedure.

The frontispiece of "The Great Doorway, Temple of Confucius, Peking," a very contrasty subject, is a triumph for the accuracy of the exposure calculator. Page 2 of the frontispiece shows a fine reproduction of a direct color photograph "June in an English Garden," illustrating how suited is "Tabloid" "Rytol" and "Tabloid" Reversing Compound for color work.

The book describes clearly and simply how to obtain good photographs. It smooths out difficulties, explains the cause of failures, and gives the remedy. The whole art of photography is passed under review and condensed in simple terms, thus providing a reliable guide from the moment of exposure to the finished picture. The book also contains numerous tables and figures which can hardly be memorized. They are most useful for reference. There is ample provision in the memorandum pages for personal records on exposures, subjects, stops, etc., of great assistance in simplifying after-work. Four editions are issued, respectively for

Northern Hemisphere and Tropics  
Southern Hemisphere and Tropics

Australasia and Tropics  
United States of America